Mathematics into Type

Updated Edition

AMERICAN MATHEMATICAL SOCIETY

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Updated Edition

Ellen Swanson

Updated by
Arlene O'Sean
and
Antoinette Schleyer

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Preface to the 1999 Updated Edition

In her Preface to the 1979 Revised Edition, Ellen Swanson mentioned dramatic changes that had taken place in typesetting since the original printing of *Mathematics into Type* in 1971. Now, twenty years later, so much more has changed in the world of publishing, not only in typesetting, but also in delivery of research to the mathematics community! Who would have imagined then the birth and rapid growth of publishing mathematics electronically?

The changes in typesetting and the eventual display of mathematics on the World Wide Web have been made possible in large part by the introduction of TEX and its offspring, LATEX, to the mathematics community. Authors have become intricately involved with the typesetting of their manuscripts, using all the features offered by TEX. Many of these same author-prepared files are later converted to HTML files and other formats for display on the Web. For these reasons, authors will be increasingly interested in the material presented in this edition, as will be production editors, copy editors, proofreaders, and technical typists.

But even in the midst of all of these changes, some things remain timeless and as useful as ever. *Mathematics into Type* falls into this category, as evidenced by its continued sales throughout the years and the urging on by long-time users not to let it go out of print.

In this edition, we keep the information needed to do a thorough, traditional copyediting and proofreading of a manuscript and proof copy. We add to it some helpful information to reflect the more technical reality of publishing today. We continue the practice of referring to procedures used by the American Mathematical Society (AMS). Some sections of this book are geared toward authors; others are intended primarily for production staff. However, authors can benefit from reading these sections as well. The information presented in them will give authors insight into the complexity of the publication process and will help them to make choices when preparing their manuscripts. For those unfamiliar with some of the conventional publishing terms used, the glossary at the end of the book provides a clear explanation.

AMS staff contributing to this updated edition consider it an honor to bring Ellen's book into its next stage of usefulness to the mathematics community. The two editors were hired by Ellen Swanson and trained under her very effective style of mentoring. Others who made significant contributions in their areas of expertise are Barbara N. Beeton, Edward Dunne, Sergei Gelfand, Lori E. Nero, Rick Porter, Ralph Sizer, and Patricia Zinni.

Preface to the 1979 Revised Edition

What are the merits of a good cookbook? Clarity, above all! The cook who has to make an apple pie needs a detailed recipe, and it will not help if the cookbook contains instead lyrical descriptions of cordon bleu dinners.

A copy editor is in much the same position as the cook. He (or she) has to attend to a variety of terms which vary from paper to paper and book to book. He has to learn to deal with each ingredient that is in the paper, whether it be punctuation of a sentence or the setting up of long and complex displayed equations. The reader of this book will find that at least some of the chapters are like cooking recipes, long and detailed. The purpose is to be practical; to give useful rules and procedures for publishing a mathematics book, rather than to compose lyrical mathematical concepts.

However, unlike the cookbook for which there seems to be one to fit every need (even for those who hate to cook), there is at the present time no book or pamphlet specifically designed to be used by the copy editor of mathematics. While the amount of published mathematics was increasing exponentially during the past two or three decades, several books were written to aid the mathematician in preparing a manuscript and to assist the compositor in typesetting it. Several excellent books and pamphlets appeared for the use of the copy editor of nonscientific material, but not for copy editors of mathematics. This book is designed primarily to fill this gap.

The material in this book covers the publication of mathematics from manuscript to the printed book or journal, with emphasis on the preparation of the copy for the compositor and the proofreading and makeup of the publication. As such, it also will be useful to an author who is rather directly concerned in editing a book, and will benefit any author who is preparing a manuscript for publication.

Originally, the material was written as a manual to standardize copyediting procedures and to serve as a guide for training editorial assistants who serve as proofreaders, copy editors and technical editors. In 1979 it was completely rewritten in a form that could be used by publishers and authors as a guide in preparing mathematics copy for the printer. In the first edition which was published in 1971 it was assumed that typesetting was by the Monotype system. At that time several kinds of composition, including phototypesetting, were in use for mathematics but the bulk was still done by Monotype. By 1979 this has changed dramatically and the bulk of mathematics is composed by phototypesetting, whether it be with or without the computer. The second edition has been revised to reflect this change in composition methods. It means that, if someone is still using Monotype, reference should be made to the first rather than the second edition. The changes in this edition mainly reflect the fact that some of the restraints of Monotype do not hold for composition by phototypesetting. The difference is mainly between what can be

set by individual pieces of metal type and what can be produced photographically. There are fewer limits on the number and size of characters available as well as their positioning in relation to each other.

Although practice differs from one publishing house to another, the author believes it to be of general interest to share her experience, gained during twenty years of publishing mathematics. The result is that in many places through the book reference is made to the procedures used at the American Mathematical Society, using the abbreviated form of the Society's name (AMS). When the AMS is mentioned, the reader should be cognizant of the fact that the particular example of style or technique given represents the bias (and the experience) of a particular publishing house and is given only as a guide to the copy editor.

The author wishes to thank the many people who have made this book possible. Without the encouragement and suggestions of Dr. John McNamee, Executive Director of the Canadian Mathematical Congress, the first edition book would probably never have been published. Dr. Gordon L. Walker, Executive Director of the American Mathematical Society, conceived the idea of publishing this material and prodded the author into finishing the project. Suggestions for the second edition of the book were made by Lincoln Durst, Deputy Director of the AMS, and by several editorial assistants and copy editors including Barry Doherty, Sandra Scott and Ralph Sizer.

Ellen E. Swanson
Director of Editorial Services
American Mathematical Society

1

Especially for Authors

Published mathematics originates as an idea in the mind of the mathematician, is put into manuscript form, sent to an editor for acceptance, and then copyedited, set into type, and proofread before it is finally published. Increasingly, there is a merger between putting the mathematics into manuscript form and setting it into type, with many authors keying their own electronically prepared manuscripts. In turn, author preparation of electronic manuscripts has influenced current copyediting and proofreading practices, since authors generally prefer to have their electronically prepared manuscripts edited as lightly as possible. As a result the AMS has developed editorial-light guidelines for copyediting papers accepted for publication in AMS journals and in some AMS books, with favorable response from the authors. See §2.6.1 for a description of editorial-light copyediting.

A sketch of the steps in manuscript preparation, submission, and processing is given in Tables 1 and 2 at the end of this chapter. Table 1 covers procedures from the time when a traditionally prepared or an electronically prepared manuscript is drafted to the time when it is accepted. Table 2 covers procedures from acceptance of the manuscript to the time it is sent to the printer. The processing of the manuscript before it is accepted for publication is covered briefly in §1.1. Scheduling is mentioned briefly in §1.3, but Table 2 gives a reasonable number of weeks that may be expected to be spent at each step of production. Printing is not considered here and composition is considered only insofar as it affects the copyediting process. See [**2**] for further information on these points.

1.1 THE AUTHOR PREPARES AND SUBMITS A MANUSCRIPT

As mentioned in the new Preface to this book, authors have become intricately involved with the typesetting of their manuscripts by providing publishers with electronically prepared files. In some cases, output from these electronic files is used as camera copy by the printer. In other cases, the files are manipulated and passed through a production stream that creates a general uniformity of design among articles within a publication. In both cases, the author is able to have the mathematics, especially the displayed mathematics, presented in the format of his choice, for the most part.

For both electronically prepared manuscripts and traditionally prepared manuscripts, there are several areas of manuscript preparation that the author should be mindful of in addition to the mathematics. If he

does, the amount of editorial and technical intervention and manipulation needed will be minimized, thus reducing proofreading time for the author and possibly shortening the time to publication. The author should give special care to

(a) clear and concise writing,
(b) an organized arrangement of material, and
(c) careful selection of notation.

1.1.1 Selecting notation

Judicious selection of notation improves the readability of a paper. The mathematician needs to ponder carefully the notation that is used in order that the result be exactly what is intended. Here is an example of the kind of pitfall that should be avoided. Authors sometimes use the Greek letter χ which is designed to fall below the level of the printing line, much like the letter y in the Latin alphabet. Yet in proof it is not uncommon for the author to ask that it be raised because he thinks it is in the subscript position. To the author's eye it looks wrong as it is printed; however, raised, it is incorrect. This is definitely a case where poor judgment causes authors, production editors, and compositors to be equally frustrated.

To avoid such pitfalls, authors should consult books on publishing mathematics before submitting a first manuscript. *The Chicago Manual of Style* (titled *A Manual of Style* until the thirteenth edition), published by the University of Chicago Press [**1**], has been a standard reference in the publishing field for many decades; in 1969 the twelfth edition contained for the first time a chapter on "Mathematics in type". A list of suggestions regarding notation is given in Appendix A of the present book.

1.1.2 Typing the manuscript; Using style files

With the introduction of TEX and the near-universal use of the computer, enormous changes have taken place at this stage. However, there are still manuscripts prepared in the traditional fashion, using a typewriter or a word processor.

For the traditionally prepared manuscript, once it is written in rough draft, it must be typed, preferably by a typist experienced with mathematical material because spatial relations between symbols are important to the clarity of the manuscript. For typists inexperienced in technical typing, the material in Chapters 2 and 3 of this book may be particularly helpful.

For manuscripts prepared electronically, using TEX and TEX macros, there is increased ease in making changes to the use and placement of characters. See the Bibliography for TEX and LATEX reference books.

In both cases, the final draft should be read carefully by the author to be sure that it is correct, consistent, and unambiguous. There should be no room for doubt as to the identification of every symbol or to its horizontal or vertical placement in relation to other symbols; this is especially important in handwritten notation.

Before the final draft is made, the author might want to select the publisher to whom the paper is to be submitted in order to check on

any format requirements that would affect the final preparation of the manuscript. Even after the publisher is selected, the author should keep "free-styling" of the manuscript preparation to a minimum, since the article or book might appear in a publication other than the one to which it was originally submitted.

The AMS offers style files to authors, which greatly reduces the time and effort needed to process a manuscript prepared in TEX. The AMS encourages electronically prepared manuscripts, with a strong preference for $\mathcal{A}\mathcal{M}\mathcal{S}$-LATEX. The AMS has prepared $\mathcal{A}\mathcal{M}\mathcal{S}$-LATEX author packages for most AMS publications. Author packages include instructions for preparing electronic manuscripts, the *AMS Author Handbook*, samples, and a style file that generates copy according to the particular design specifications of the publication series. Though $\mathcal{A}\mathcal{M}\mathcal{S}$-LATEX is the highly preferred format of TEX, style files are also available in $\mathcal{A}\mathcal{M}\mathcal{S}$-TEX.

During this decade there has been a steady increase in the number of manuscripts prepared electronically for AMS publications. In 1997 approximately 85% of the papers submitted to AMS journals were prepared electronically by or for the authors and then sent to the AMS in electronic form after acceptance. For some journals the percentage was even higher. For books 73% of submissions were electronic.

With the advent of publishing on the World Wide Web, there is an increasing need to prepare electronic manuscripts with the electronic version of the product in mind right from inception. Journal articles properly prepared for AMS publications, using the $\mathcal{A}\mathcal{M}\mathcal{S}$-LATEX style file, automatically provide hypertext linking, after conversion to HTML, to the bibliography and other elements of the article for searching electronically on the Web. Because linking must often be added manually to electronically prepared manuscripts in other forms of TEX, using $\mathcal{A}\mathcal{M}\mathcal{S}$-LATEX also reduces the amount of technical intervention once the files are received by the AMS. Therefore, $\mathcal{A}\mathcal{M}\mathcal{S}$-LATEX papers move more efficiently through the AMS production stream, helping to minimize publishing costs and time. Less processing results in fewer processing errors and saves the author proofreading time.

Table 3 goes a step beyond the printed page and takes articles from the paper product to the electronic product. It gives a brief summary of AMS procedures from creating files for the electronic version of journals through posting on the Web. The home page of the AMS is located at `http://www.ams.org`. Information for authors can be found starting from `http://www.ams.org/authors`. Journals can be found starting from `http://www.ams.org/journals`. Information for book authors can be found starting from `http://www.ams.org/authors/bookprogram.html`.

1.1.3 Submitting the manuscript

The decision of selecting a publisher may not be easy when one considers that there are many publishers of primary research journals, with new print and electronic journals regularly coming into existence. There are also many publishers of research and expository monographs.

Manuscripts for publication are usually submitted to a designated editor of a society, university press, or commercial publisher. For a journal article, it is likely that the manuscript will be handled through one editor, while books are usually reviewed by a committee. Both journals and books have similar acceptance procedures but, since the number of authors of journal articles is much greater than that of books, journals will be treated in more detail in the next few paragraphs.

For many journals all manuscripts are sent to one editor, while for others the author is expected to select an editor according to the subject field or the type of article. When an article is received by an editor, it is checked for content, readability, and format (though format issues have become easier to resolve with the use of style files and with the ease of formatting via the computer). The manuscript might be rejected immediately for content. It might also be returned to the author if it is improperly prepared or not in the format required by the publisher. However, it is more likely that after determining its subject category, the editor will send the paper to a mathematician in that particular field; this mathematician, called the referee, is usually anonymous.

1.1.4 Refereeing process

Acceptance or rejection by the referee may be immediate. Often, using the editor as an intermediary to maintain anonymity, the referee makes suggestions for condensing, enlarging, or revising the manuscript. He may refer the author to relevant published articles of which the author was not aware, or he may point out errors. The referee's remarks may be such that the author may decide to withdraw the paper or to revise it. In any case the manuscript is eventually either rejected by the journal editor or accepted and sent to a production editor.

In some instances the whole refereeing process may take less than a month, but it is more likely to take three or four months. Certainly within six months an author should reasonably expect to have word on whether or not the manuscript has been accepted. However, it is not unusual for a manuscript to be a year in refereeing, and some may even be two years. Long delays are usually caused by the complexity of issues within the manuscript.

1.2 ROLE OF THE PRODUCTION EDITOR

The term "production editor" is used in this book to indicate the person who is responsible for the steps involved in converting the typed or electronically prepared manuscript into a published book or journal. He (or she) is responsible for the processes that are outlined in Tables 2 and 3 of this chapter. The production editor may use the services of copy editors, technical editors, and proofreaders and will need the services of a compositor for traditionally prepared manuscripts. Manuscripts prepared electronically in TEX require the services of a technical typist who is well versed in TEX, for the correction stages and for other stages related to

the conversion to HTML. At the AMS some production editors are able to make corrections themselves. Finally, a printer is needed.

In general, the role of the production editor is to see that the manuscript is published within budget, in a style that is consistent with the journal or book series in which it is to be published, and that it is accurate and readable. The use of series style files makes preparation and production of articles more streamlined and economical. For AMS articles published on the Web, use of the style files is essential.

1.3 SCHEDULING PUBLICATIONS

Table 2 includes an estimate of the number of weeks that each step in the editorial process can be expected to take under normal conditions. Upon adding up the weeks, it can be seen that even with an excellent schedule, publication may take at least four months after acceptance of a manuscript.

Variation in publication time may be due to delays at any one of the steps in the table. If a journal has a large backlog, the time between receipt of the manuscript by the production editor and sending it to the compositor may be extended. However, properly prepared electronic manuscripts generally move more quickly through this stage since keyboarding the paper is not necessary, just minimal corrections to the electronic file submitted by the author. It may also be difficult to obtain time in the compositor's production schedule. If there is deviation from the schedule originally made with the compositor, it may cause loss of priority for composition time. Also, it is important that authors hold author proof no longer than the five or ten days usually allowed.

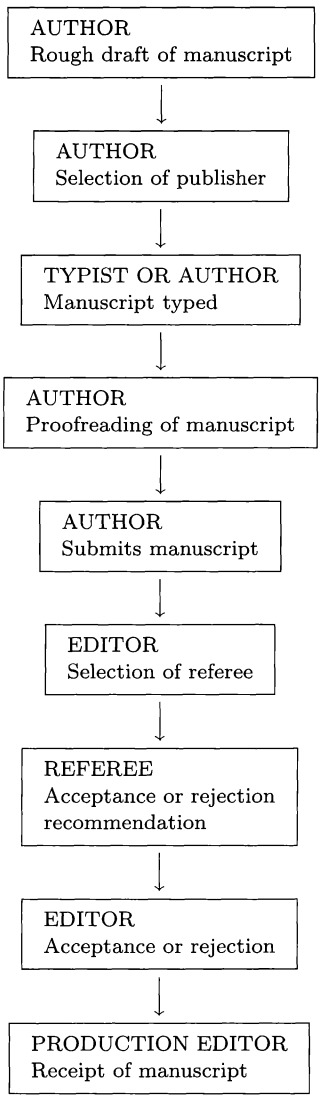
1.4 TABLES FOR PUBLISHING MATHEMATICS

The tables that follow show compactly the main steps in the production of a publication in mathematics.

Monographs might take longer than journals for several reasons. This is partly because authors sometimes check final proof as well as the usual author proof. Indexes sometimes delay publication. Hard cover binding may add 4–6 weeks to the printing and binding schedule.

TABLE 1

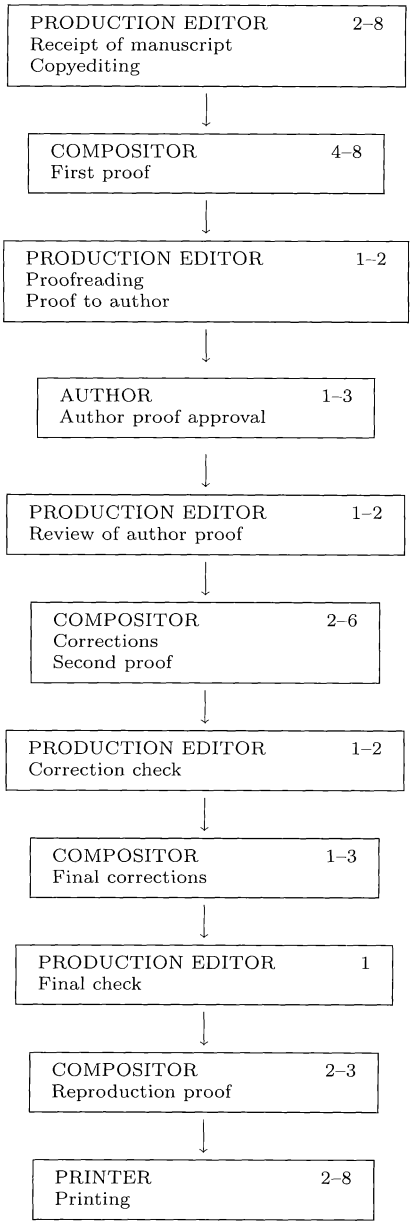
A Mathematics Paper from Traditionally Prepared or Electronically Prepared Manuscript to Acceptance



Puts manuscript into a condition that can be interpreted by typist or prepares own electronic manuscript.	
Selects publisher.	
Types manuscript in final form or reformats electronically prepared manuscript using publisher's style file.	
Proofreads manuscript. Fills in handwritten symbols if necessary.	
Determines editor and submits manuscript.	
Checks manuscript for content and format. Selects referee in mathematical field of manuscript.	
Reads manuscript for validity and originality. Returns it to editor with one of the following recommendations: (a) acceptance, (b) rejection, (c) correction or revision by the author.	
Informs author of referee's recommendation. In cases (b) and (c) the manuscript is returned to the author. If accepted, sends it to the production editor.	
See Table 2	

TABLE 2

Mathematics from Accepted Manuscript to Publication



Acknowledges receipt of manuscript from editor or author. Chooses compositor and printer. Sets up production schedule. Arranges for copyediting.

Keyboards manuscript or processes electronically submitted manuscript. Produces first proof.

Proofreads first proof. Sends proof to author with errors indicated. Sends form for ordering offprints to author. Follows up with author on copyright transfer agreements not received.

Proofreads author proof. Indicates errors. Answers questions on proof. Fills out offprint order form. Signs copyright transfer agreement, if not already returned to publisher.

Reviews author proof to be sure corrections and comments are clear for the compositor.

Makes corrections. Sends second proof to production editor.

Checks corrections. Proofreads reset lines.

Makes final corrections. Files must be entirely free of corrections before they can be transmitted for reproduction proof.

Reviews final corrections. Repeat step above if any corrections remain.

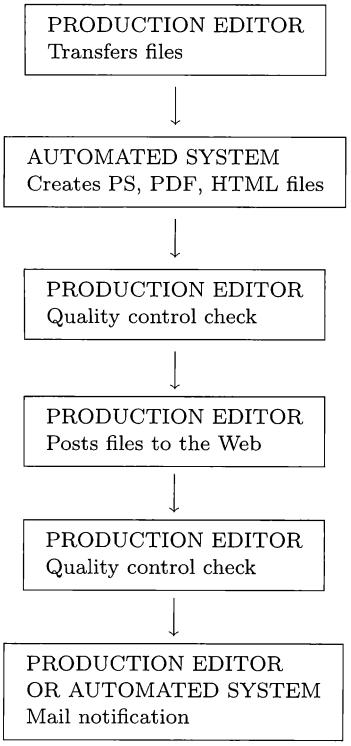
For many AMS publications the printer produces imposed negatives from electronic files of each article. Paper camera copy is not produced.

For AMS publications the printer sends folded-and-gathered signatures for a quality control check before binding.

NUMBERS in the boxes tell how many weeks might normally be used in journal production. Book production might take longer or, in the case of camera-ready books, not as long.

TABLE 3

Mathematics from Print Product Environment to Electronic Product



Transfers TEX and DVI files from paper production environment to electronic production environment.

Automated system produces high and low resolution PS files from DVI file; PDF file from high resolution PS file; and HTML file from TEX file.

Performs quality control check of PS, PDF, DVI, and HTML files in electronic production environment. Makes minor corrections.

Transfers all files from electronic production environment to the World Wide Web.

Performs quality control check of files posted to the Web.

Sends notification e-mail of the posting to author(s) of the work, subscribers, and interested parties.

The home page of the AMS is located at `http://www.ams.org`.
Information for authors can be found starting from `http://www.ams.org/authors`.
Journals can be found starting from `http://www.ams.org/journals`.
Information about the book program can be found starting from
`http://www.ams.org/authors/bookprogram.html`.

2

How to Mark Mathematical Manuscripts

Chapter 1 was written primarily for authors. Chapter 2, on the other hand, contains a large amount of detailed information for copy editors and production staff, though authors will find it useful and interesting, particularly if they are preparing electronic or camera-ready material.

2.1 COPYEDITING

Once an author's paper has been accepted by the editor, it is presumed to be a correct manuscript that needs merely to be converted from a typewritten manuscript or an electronically prepared manuscript to printed copy. Actually, it is not that simple. The first step for a traditionally prepared manuscript, an essential step in the editorial process, is to mark the manuscript for the compositor. This is one of the most important steps, if not *the* most important step, of the whole process. In this section the purpose and aim of manuscript marking by the copy editor are given in detail.

For manuscripts prepared electronically by the authors, current AMS practice is to copyedit papers as lightly as possible. This is also the preference of many authors, who have invested time carefully preparing the text of the paper as well as its display on the printed page. To accommodate this change in copyediting preference, the AMS has developed editorial-light guidelines for copyediting papers. See §2.6.1 for a description of the editorial-light copyediting guidelines. Other helpful suggestions on manuscript preparation may be found in David Goss' *Some Hints on Mathematical Style* [**7**].

Another recent change in editorial practices at the AMS is to combine copyediting and proofreading into one step. For a traditionally prepared manuscript, where the AMS typesets the paper, instead of copyediting before keying the paper and proofreading after keying the paper, the AMS performs both tasks, using the editorial-light guidelines, after the paper has been keyed. Raw manuscripts are sent to experienced technical typists with very good results. A look through the manuscript to flag unclear or ambiguous notation is all that is needed for the technical typist to avoid numerous corrections in later stages of production.

2.1.1 Legibility and typographical accuracy

When a manuscript is sent to the compositor for typesetting, it must be legible and typographically accurate. It is to the advantage of the

author, as well as the publisher, that the manuscript be legible because the eventual accuracy of the printed paper is partially determined at this point. Errors tend to generate errors and, if the manuscript to be typeset contains inaccuracies, they will be reflected in the first proof. In turn, the more errors in the first proof, the more there will tend to be in the final proof and in the eventual publication. Legibility and typographical accuracy are, therefore, the first concerns of the copy editor.

2.1.2 Maintenance of a consistent style

Another purpose of copyediting is to maintain a consistent style throughout the journal or book. In addition to conformity within a manuscript, adherence to the style of a journal or book series may be required. Sometimes these rules seem arbitrary to an author, but the publisher's intention is to create a more professional finished product.

Even using editorial-light guidelines for copyediting, the AMS is able to achieve consistency within a manuscript. The author's style is maintained and no errors are inadvertently introduced. Publications still maintain a high level of quality, professionalism, and polish.

2.1.3 Appearance of the printed page

The production editor should be concerned with all matters that affect the appearance of a page. Insofar as this involves setting up headings, treatment of chapters and paragraphs, choice of type styles, and other nonmathematical problems, books like [**1**] and [**3**] may be consulted. These choices are often made by the production editor, particularly in journal publications, but may be the prerogative of the author. The recent use of style files, provided by the publisher, facilitates a consistent style in the appearance of headings and other text elements throughout the book or journal.

The setup of mathematical displays and the treatment of mathematical expressions are chosen for general appearance, as well as for clarity and cost. For example, printing stacked fractions in text results in unevenly spaced lines, which gives the page an uneven and rather ugly look and creates wasted space. Many publishers avoid this by setting all fractions in text with a slash (/), also known as a solidus. This kind of change requires discretion and judgment on the part of a technical copy editor.

2.1.4 Cost of mathematical composition

From the point of view of the author, one of the tasks of the production editor, that of considering cost, may be an unpopular subject, but composition is at best extremely expensive. This is particularly true of publication of original research because edition sizes are generally so small that, traditionally, composition has accounted for a significant portion of the cost of a book. However, the use of electronic manuscripts received from authors has helped to reduce this cost considerably. The publisher of mathematics textbooks is apt to be less concerned about these costs because edition sizes are larger and the composition costs relatively less

important. The production editor of a textbook may, therefore, find that some of the suggestions in this book are not relevant and should advise the copy editor accordingly. To keep costs down, the AMS monitors sales and bases edition sizes on the history of sales and the prediction of sales for each book. This helps to avoid the high cost of reprinting soon after the first printing of the book.

The cost of traditional composition depends to a great extent on the author, who determines the following factors:

(1) condition of the copy,

(2) the choice of the symbols,

(3) the complexity of the mathematical notation.

The condition of the copy includes such factors as the number of inserts, the number and readability of handwritten symbols, and whether or not a mathematical symbol, such as an exponent, is typed or handwritten in such a way that the position is obvious. In other words, can the copy be read easily?

The factors involved in understanding the problems that arise from the choice of symbols and the complexity of mathematical notation include some knowledge of the composition process and its limitations. Such information is pertinent both for the author who is choosing the notation and for the copy editor who is preparing the manuscript for typesetting. Computer-assisted composition has added to the number of fonts and the sizes that are available. Today restraints on the complexity of notation are not as limiting.

2.1.5 Choice of notation

The compositor normally has hundreds of symbols available, including italic, boldface, boldface italic, blackboard boldface, Greek, boldface Greek, script, and German. Adding subscripts, superscripts, and embellishments to these symbols increases the notations available many times. It would seem that the author has enough choices without requesting additional ones. In practice, however, authors sometimes do ask for new symbols.

Creating special symbols is expensive. For the AMS even using TEX to create such symbols and adding them to the library of available fonts is expensive, taking up the valuable time of technical staff. New notation should be introduced with care! Other authors may perpetuate the need for new symbols once they see specially created notation in print.

2.1.6 Displayed expressions

Traditionally, displayed mathematics expressions were considered very expensive because it was necessary, even with some phototypesetting devices, to count every character in order to center a display across the page and to be sure that all parts of the display were in proper juxtaposition. With computer-assisted composition, however, there is no counting and a page of display is likely to be less expensive to typeset than a page of text. One compositor remarked that he was in the business of selling as much white space as possible; therefore, he delighted in displayed expressions because they created more white space and less mathematics on a page—and he

charged by the page. When the computer is used, with programs like TEX, for example, the program does the centering and positioning.

A page full of displays involves many fewer characters than a page of text. Producing pages with a lot of white space means that there is less mathematics per page, more pages, and, therefore, higher printing bills. If the aim is to publish as much mathematics as possible at the lowest prices, then it costs less to run the mathematics into text. Even if displays are inexpensive to set, it still might cost less to run them into text, thus avoiding extra white space, having fewer pages, and reducing the printing cost.

2.1.7 Role of copy editors and technical editors

If copy is sent to the compositor in good condition, the keyboarder makes fewer errors and the first proof is returned in a cleaner form. The author is happier, the proofreader is less frustrated, and production costs are curtailed. Achieving these goals is essentially the role of the copy editor.

As mentioned in §2.1, the AMS currently combines copyediting and proofreading into one step for both traditionally and electronically prepared manuscripts, with very favorable results from very experienced technical typists. But it is not uncommon in the publishing industry for the copy editor to read through the manuscript several times, first marking the copy for style and clarity and then doing the technical editing. Technical editors either have a background in mathematics or considerable experience in copyediting. At the technical editing step the mathematics is checked for consistency and for possible simplification or rearrangement of mathematical expressions.

An author reading this manual might feel that some of the changes that are suggested limit the readability of a paper. A skillful technical editor, however, is discriminating in editing and is more apt to improve the paper than to make it less readable.

When the manuscript contains notation that is difficult to set, the copy editor also works together with the production editor, suggesting alternative notation for the author to consider. Often it is rather easy to substitute notation. For example, in the text of an article, the author might say, "Let X stand for $\hat{\tilde{x}}$ throughout this paper." The more complex notation is simplified, and it is necessary to set the double embellishment symbol only once. However, using TEX and a TEX macro for $\hat{\tilde{x}}$ makes it easier to retain the double embellishment throughout the paper, still setting it only once. But even using TEX macros, the author might want to avoid cumbersome expressions with double embellishments in order to avoid adding extra space between the lines of text and to improve readability.

2.2 THE COPY EDITOR'S MARKS

It is important that the copy editor make a manuscript as clear as possible for the compositor. There should be no doubt as to the identification, size, and position of every handwritten and typed letter or symbol in

TABLE 4

Copy Editor's Marks

Pencil Color	Mark	Meaning
blue (or black)		italic
blue (or black)		italic caps
blue (or black)		roman caps
blue or red	light stroke thru letter	change to lower case
blue (or black)		small caps
blue (or black)		boldface
red		lc Greek
red		cap Greek
orange		roman
blue (around letter)		script caps
green		lc German
green		cap German
red or blue		6 or 7 point space between lines
red or blue		bring notation closer
red or blue		close up notation
red or blue		transfer (transpose)
red or blue		paragraph
red or blue		em quad
red or blue		2-em quad
red or blue		superscript
red or blue		subscript
red or blue		superscript to superscript
red or blue		subscript to superscript
red or blue		subscript to subscript
red or blue		superscript to subscript
red or blue		pull expression to right
red or blue		pull expression to left
red or blue (to left and right of expression)		center the expression between markings
red or blue		set as "$(n+1)/b$"

Notes. Copy editor's marks are made in the body of the text; extensive changes are made in the margin. Color codes in the table above are AMS conventions.

the manuscript. To perform this function, the copy editor uses a set of markings, which might be referred to as tools of the trade. See Table 4.

Although these editorial markings should be used in every place in a manuscript where they contribute to clarity and understanding of the notation, they should not be overused. A limited number of markings on a manuscript has several advantages:

(1) It results in a clean manuscript that is quickly read.

(2) If a symbol that is typed or written clearly is identified only once, instead of every time it appears, it avoids confusion and uncertainty in case an occurrence of the symbol is inadvertently unmarked.

(3) The compositor knows from experience with a particular copy editor whether or not every mark has a purpose and must be especially noted.

(4) It saves the time of both the copy editor and the compositor.

In general, when a new notation occurs, only its first appearance needs to be marked. If a symbol is poorly written, if a matter of interpretation is involved, or if any sort of confusion could arise, then every occurrence should be plainly marked. As an example, the Greek letter epsilon (ε) and the mathematical sign meaning "is a member" ($\in$) are easily confused. Every occurrence of one or the other should be marked, and the typesetter should be given specific instructions as to the convention used in marking.

2.3 TYPOGRAPHIC CONVENTIONS

2.3.1 Italic

Italic *words* in text are always underlined. However, because *letters* used as mathematical variables are nearly always set in italic, a compositor experienced with mathematics does not need or want them to be marked. Even the first occurrence of such a letter should *not* be noted.

Exceptions: (1) When a letter like "a" is used as a variable, but might be mistaken for a word, it should be marked for italic. (2) Every occurrence of an italic "o" should be marked. This exception is based on the premise that the compositor is instructed to set all circles as zeros unless they are marked otherwise (see Appendix G). The reason for this rule is that many typists mistakenly use a lower case "o" to indicate zero in the subscript or superscript.

2.3.2 Roman

Underlining with three blue or black lines is standard marking for a roman capital letter. There is, however, no standard mark to indicate a roman lower case letter. Nonmathematical copy has little or no use for such a marking, but in mathematics it is often necessary to distinguish between functions and properties, which are printed in roman, and variables, which are printed in italic; in symbolic logic both roman and italic variables are often used. In traditional AMS editing, an orange underline is used to indicate roman in any place where it might be mistaken for an italic letter.

See §2.4.5 concerning the use of roman for mathematical type.

2.3.3 Greek

Greek letters do not need to be marked except for the first time each letter occurs in the mathematics, if they are typewritten or handwritten legibly. Even if a Greek letter is poorly written, it needs to be identified only once unless it could be confused with another symbol used in the paper.

Exceptions: The Greek letter epsilon (ε), capital sigma (Σ), and capital pi (Π) should be underlined every time they occur, especially when the member sign ($\in$), summation symbol ($\sum$), and product symbol ($\prod$) also occur in the manuscript. If the ε, Σ, and Π are not underlined, typesetters are usually instructed to set them as $\in$, $\sum$, and $\prod$.

A special note to the compositor on the manuscript at the first occurrence of these characters or on an information sheet will help to avoid errors and costly corrections. See "Information Sheet for Compositor" in Appendix G.

The following Greek capital letters need to be marked because of their resemblance to the roman letter. They are, however, seldom used by authors of mathematics.

Capital Greek letter	A	B	E	Z	H	I	K	M	N	O	P	T	X
Lower case form	α	β	ε	ζ	η	ι	κ	μ	ν	o	ρ	τ	χ

2.3.4 German (Fraktur)

Unless the author is able to provide a German (Fraktur) font, it is preferred that German letters be typed in the manuscript as a capital or lower case roman letter and underlined (in green) by the author or copy editor every time they occur. Even if German letters are handwritten, it is doubtless good practice to identify each symbol unless it is definitely unique. For instance, the handwritten forms of German capital D ($\mathfrak{D}$), German lower case d ($\mathfrak{d}$), and curly theta (ϑ) are all almost identical. There is also similarity between some German and script letters (see Appendix F).

Note. Sometimes authors use the word "Gothic" to identify letters. Gothic is technically bold or sans serif type, but authors frequently use it to indicate German letters.

2.3.5 Script

If handwritten, script should be identified upon its first use because it is easily confused with the German handwritten alphabet. For example, the typesetter may not be able to tell whether a handwritten capital $\mathcal{N}$ is supposed to be script or German unless it has been identified.

A circle in blue pencil around a typed letter is a good method for identifying script. Script is usually only in capital letters, though a few lower case script letters are used occasionally. Lower case script l (ℓ) is an example.

2.3.6 Hebrew

Authors seldom use Hebrew characters except for the aleph ($\aleph$) and occasionally the beth ($\beth$), which are both used as full-sized symbols and as

superscripts or subscripts. With the use of computer-generated type and with such programs as TEX, there is no chance of the aleph being typeset upside down. However, when Monotype was widely used, the aleph very often appeared upside down in print, and even more often in proof.

The reason for this widespread error is that a Monotype matrix for the aleph was constructed upside down many years previously. Each slug had an orientation based on grooves in a vertical face, so that once the error was made, it was perpetuated because the slug would not fit into the matrix case in the correct position. A hand operation was required to put the piece of type into proper position. Another reason for the perpetuation of this mistake was the confusion caused by seeing the letter in two different positions.

2.4 MATHEMATICAL EXPRESSIONS

In the previous section suggestions were given concerning treatment of individual mathematical symbols. When these symbols are put together into mathematical expressions, there are additional considerations involving the relationship of symbols to each other. Even the treatment of the same mathematical expression may differ when it is set in text rather than in display. These concerns are greatly diminished by the use of TEX since TEX very easily handles the sizing and spacing of each character and produces beautifully formatted mathematical expressions both in text and in displays.

Reference is made in this section to symbols by "point size". A point is a standard measurement used in printing: 12 points equal a pica, and 6 picas are approximately an inch. All type sizes are indicated in points. Mathematics is often set in 10-point type with 2 points of space between lines; this is referred to as "10 on 12", that is, 10-point type on 12-point body or 2-point leading. (This book is typeset in 10 on 12.) In a particular typeface, point sizes are proportional in height, 20-point type being exactly twice as high as 10-point type. Most research mathematics is set in either 9- or 10-point size in the text, with oversized symbols, such as the summation sign ($\sum$), being set in a slightly larger point size.

EXAMPLES: 10-point type on a 13-point body.

> Let $\{y_k\}$ be a sequence in a locally convex space E. The series $\sum_{k=1}^{n} y_k$ is said to converge unconditionally to an element y of E if for every permutation p of the positive integers the series $\sum_{k=1}^{n} y_{p(k)}$ converges (in the usual sense) to y.

10-point type on a 12-point body.

> Let $\{y_k\}$ be a sequence in a locally convex space E. The series $\sum_{k=1}^{n} y_k$ is said to converge unconditionally to an element y of E if for every permutation p of the positive integers the series $\sum_{k=1}^{n} y_{p(k)}$ converges (in the usual sense) to y.

9-point type on a 14-point body.

> Let $\{y_k\}$ be a sequence in a locally convex space E. The series $\sum_{k=1}^{n} y_k$ is said to converge unconditionally to an element y of E if for every permutation p of the positive integers the series $\sum_{k=1}^{n} y_{p(k)}$ converges (in the usual sense) to y.

2.4.1 Fractions

2.4.1a Stacked fractions (fractions of the type $\frac{a}{bx}$)

Some publishers do not allow these in text because they require spreading of lines in the printed copy, i.e., they cannot be set without adding extra space between lines. TEX offers a variety of fraction sizes for setting fractions in text and can easily overcome the restrictions of Monotype, especially for simple fractions without superscripts or subscripts in the numerator or denominator of the fraction. For example, this fraction can be set as $\frac{a}{bx}$ without causing the lines to spread. For even more complicated fractions, TEX is able to provide acceptable copy with minimal spreading of text lines.

When it is desirable to avoid stacked fractions in text, this can be done in at least two ways. The first is by using a slash, and the second by introducing a negative exponent. These two methods are shown below; all three of the expressions have the same meaning.

$$\frac{a}{b} \qquad a/b \qquad ab^{-1}$$

Substituting a slash and changing to negative exponents are operations that should be performed only by a copy editor with a knowledge of the operations involved or by the author. A rule of thumb that should be used by a copy editor is: "If in doubt, either don't do it or ask someone who knows."

Below are examples showing correct and incorrect ways of changing fractions.

REPLACE	BY	OR	NOT BY
$\frac{a+1}{b}$	$(a+1)/b$	$(a+1)b^{-1}$	$a+1/b$
$\frac{a}{(x+1)^3}$	$a/(x+1)^3$	$a(x+1)^{-3}$	
$\sin\frac{a}{x}$	$\sin(a/x)$		$\sin a/x$
$\frac{\sin a}{x}$	$(\sin a)/x$	$x^{-1}\sin a$	$\sin a/x$
$\frac{a}{x^3}$	a/x^3	ax^{-3}	
$\frac{\partial}{\partial\theta}F(u,\theta)$	$\partial F(u,\theta)/\partial\theta$	$(\partial/\partial\theta)F(u,\theta)$	$\partial/\partial\theta F(u,\theta)$
$\frac{\partial}{\partial x}\rho$	$\partial\rho/\partial x$		

2.4.1b Numerical fractions

Common fractions can often be set as case fractions.

$$\tfrac{1}{4} \quad \tfrac{1}{2} \quad \tfrac{3}{4} \quad \tfrac{1}{3} \quad \tfrac{2}{3} \quad \tfrac{1}{8} \quad \tfrac{3}{8} \quad \tfrac{5}{8} \quad \tfrac{7}{8}$$

Their use makes the slash unnecessary and the expression may look less clumsy. In text, the case fraction is almost always used. In a display, however, case fractions should not be used with stacked fractions because the combination usually looks ridiculous.

REPLACE	BY
$\frac{1}{2}x + \dfrac{3}{16}y + \frac{1}{4}z - \dfrac{7}{32}x'$	$\dfrac{1}{2}x + \dfrac{3}{16}y + \dfrac{1}{4}z - \dfrac{7}{32}x'$

Using TEX, this can also be set easily in the more preferred style

$$\tfrac{1}{2}x + \tfrac{3}{16}y + \tfrac{1}{4}z + \tfrac{7}{32}x'$$

2.4.1c Continued fractions

A continued fraction is generally more difficult to typeset and requires several lines of space, though once again programs like TEX make this typesetting easier. In research papers an alternative form can be used. The standard form and two of the commonly used alternatives are shown below.

$$\text{STANDARD FORM: } a_0 + \cfrac{b_1}{a_1 + \cfrac{b_2}{a_2 + \cfrac{b_3}{a_3 + \cdots}}}$$

$$\text{ALTERNATIVES: } a_0 + \frac{b_1}{a_1 +}\,\frac{b_2}{a_2 +}\,\frac{b_3}{a_3 +}\,\cdots$$

$$a_0 + \frac{b_1}{a_1 +}\,\frac{b_2}{a_2 +}\,\frac{b_3}{a_3 +}\,\cdots$$

Note that in the alternatives the plus signs are on a line with the symbols in the denominator. When a continued fraction occurs in a manuscript, a note should be made on the information sheet for the compositor (see Appendix G) to set it exactly as it appears; otherwise the compositor is apt to set it as an ordinary fraction.

A continued fraction cannot be changed by slashing or using a negative exponent.

2.4.1d Fractions in the subscript and superscript

These are usually replaced by use of the slash. Often this makes the expression easier to read. Depending on the font size used, the type may be extremely small when a subscript or superscript is set as a case fraction.

REPLACE	BY
$x^{\frac{1}{2}}$	$x^{1/2}$
$y_{\frac{a+b}{x-z}}$	$y_{(a+b)/(x-z)}$

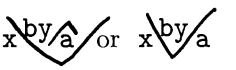
Even using TEX, an expression with fractions in both the subscript and superscript could become difficult to read.

REPLACE	BY
$x^{\frac{\frac{z^2}{2}}{\frac{y^2}{2}}}$	$x^{z^2/2}_{y^2/2}$
$y^{\frac{a^2+b^2}{x-z}}_{\frac{c^2+d^2}{x-z}}$	$y^{(a^2+b^2)/(x-z)}_{(c^2+d^2)/(x-z)}$

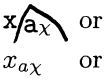
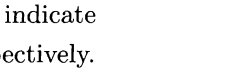
2.4.2 Subscripts and superscripts

2.4.2a Copy editor's markings

In accordance with the practice suggested in §2.2 of not overmarking a manuscript, subscripts and superscripts should be marked only the first time they occur, or not marked at all, if the manuscript is clear and not subject to misinterpretation. This holds for both first and second order indices. However, in every case where the manuscript is not absolutely clear as to the spatial relations, it should be marked by the copy editor.

$x^{by}{}_a$ should definitely be marked as either  or

to indicate either x^{by_a} or $x^{by}a$, respectively.

x_{a_χ} should be marked  or  to indicate

$x_{a\chi}$ or x_{a_χ}, respectively.

2.4.2b Expressions with both subscripts and superscripts

Superscripts are usually aligned directly over subscripts in the manner shown below.

$$x^n_m \qquad x^{a-b}_c \qquad x^{mn}_{ay} \qquad x^{a^m}_{c_n}$$

In tensor notation the position of the indices may have a specific meaning, and they should be typeset in the position indicated on the manuscript. This may mean staggering the superscriptions as shown below.

$$x_\mu{}^\nu \qquad x^\nu{}_\mu$$

Try to avoid notation like the following, since it is difficult to read and its meaning unclear.

$$x^{e^s_n}_{c^n_a}$$

2.4.2c The exponential function

The terms e^x and $\exp x$ are identical in meaning and can be interchanged almost at will. The "e" notation should be changed to exp notation whenever an expression becomes cumbersome.

Some examples of alternative notation are given below. As authors often use both types of notation in the same paragraph, or even the same sentence, it is proper to change from e to exp in one place in a sentence or paragraph without changing other occurrences of the same notation.

	INSTEAD OF	USE
To avoid double superscript	e^{x^3-1}	$\exp(x^3-1)$
To avoid fractions in the superscript	$e^{\frac{a-b}{c+d}}$	$\exp\left(\frac{a-b}{c+d}\right)$ or $\exp((a-b)/(c+d))$
To avoid other cumbersome notation	$e^{\sum_1^2 ab}$	$\exp(\sum_1^2 ab)$ or $\exp\left(\sum_1^2 ab\right)$

2.4.3 Fences (also called brackets, closures, or signs of aggregation)

In mathematics several types of fences are used. The most common are the following:

Parentheses ( )	Brackets [ ]	Braces { }
Angle brackets $\langle\ \rangle$	Single bars | |	Double bars $\|\|\ \|\|$

These are usually used in pairs but occasionally are used in combinations such as the following:

$$(a,b] \qquad [a,b) \qquad [a,b[$$

All occurrences of such unusual pairs should be brought to the attention of the compositor to avoid misunderstanding. Less and greater symbols ($<$ and $>$) should not be used for angle brackets.

In some books on mathematics in type it is suggested that there is a preferred order for common enclosures, usually beginning with the parentheses on the inside followed by brackets and braces in this manner:

$$\{[(\ )]\}$$

Often, however, authors of research mathematics attach a special meaning to different types of enclosures, and this author believes that they *should be left in whatever order and variety the author has indicated in the manuscript*. It is always desirable, however, to *count* the pairs because it is not uncommon for an author to leave out the closure of a parenthesis or a bracket in error.

2.4.3a Fences in large sizes

Commonly the larger size fences are used around stacked fractions or integrals and other larger size characters, such as $\sum$, $\prod$, $\bigcap$, and $\bigcup$, rather than around single characters. The sizes can be indicated by the copy editor for some composition methods. However, with computer-assisted composition, fences may be automatically sized by the program.

Some automated methods of composition might either enlarge or decrease the size of a basic symbol in order to get a larger one. This can mean distortion, particularly when they are enlarged to the size needed for a matrix; square brackets may be preferable to parentheses in large sizes because there is no distortion, only thickening of the lines. TEX, however, provides different sized fences so that this distortion does not occur. For example, in the matrix below, TEX is able to produce appropriately sized parentheses. In other typesetting programs it may be advantageous to replace these large parentheses by brackets, as shown on the right.

$$\begin{pmatrix} a & b & c \\ d & e & f \\ g & h & i \end{pmatrix} \qquad \begin{bmatrix} a & b & c \\ d & e & f \\ g & h & i \end{bmatrix}$$

When large braces are difficult to set, here are some ways in which they can be avoided.

$$(1)\begin{cases} x = a + b, \\ y = c + d, \\ a = e + f. \end{cases} \qquad \begin{array}{rl} & x = a + b, \\ (1) & y = c + d, \\ & a = e + f. \end{array}$$

$$a(x) = \begin{cases} 0 & \text{when } x \leq 1 \\ 1 & \text{when } x = 2 \\ 2 & \text{when } x \geq 3 \end{cases} \qquad \begin{array}{lll} a(x) = 0 & \text{when } x \leq 1, \\ \quad = 1 & \text{when } x = 2, \\ \quad = 2 & \text{when } x \geq 3. \end{array}$$

Be sure that such changes are clear and that the mathematical meaning cannot be misconstrued. Some authors object to this editorial change.

2.4.4 Sums, products, unions, integrals, etc.

2.4.4a Sums and products

Traditionally, these were actually a large version of the Greek capital sigma and capital pi, respectively, and were set as larger or bolder symbols in order to distinguish them from the Greek. In modern computer typesetting systems the shapes of these symbols have been modified to distinguish them from the Greek. In 10-point type, a 14-point symbol is now used in display and a 10-point symbol in text.

In text, the subscripts and superscripts usually follow the symbols, while in display they are normally printed above and below.

IN TEXT: $\sum_{a=1}^{\infty}$ $\prod_{a=1}^{\infty}$ IN DISPLAY: $\displaystyle\sum_{a=1}^{\infty}$ $\displaystyle\prod_{a=1}^{\infty}$

In the past some publishers used to place subscripts and superscripts to the right of sums and products both in text and display to avoid extra

typesetting costs. Aesthetically it is preferable to set them in display as shown above, and with modern computer typesetting systems it is no more expensive. In text, though, beware of expressions like

$$\sum_{i=1}^{N}{}', $$

where the prime has some specific meaning, and moving the N to the side may cause confusion.

2.4.4b Unions and intersections

Treatment is similar to that for sums and products.

IN TEXT: $\bigcup_{i=1}^{\infty}$ $\bigcap_{i=1}^{\infty}$ IN DISPLAY: $\bigcup\limits_{i=1}^{\infty}$ $\bigcap\limits_{i=1}^{\infty}$

2.4.4c Integrals

These are usually designated by a 10-point symbol in text and a larger size (usually 18-point or 24-point) in display.

When a single integral is used, the subscripts and superscripts always follow the symbol. For multiple integrals used in display, the subscripts and superscripts may be centered above and below them.

$$\int_a^b \qquad \iint_A \qquad \iiint_A \qquad \iint\limits_{-\infty}^{\infty} \qquad \int_0^1 \int_0^1$$

2.4.4d Other symbols

The same general rules apply for large $\bigwedge$, $\bigvee$, $\&$, $\bigoplus$, and whatever other symbols an author may wish to use in this way.

2.4.5 Abbreviated forms of mathematical terms

When letters are used as abbreviations rather than as mathematical symbols, they are usually set in roman rather than italic characters so that they will not be confused with mathematical variables. Most of the functions and operators that are commonly set in roman are readily identified. In other cases the copy editor will need an excellent intuitional sense and/or mathematical knowledge to decide between a roman and italic typeface. Table 5 gives a comprehensive, though not exhaustive, list of terms that are ordinarily set in roman type. Some of these are used so often that an experienced mathematical keyboarder will need only the first occurrence marked or identified.

Note also that these abbreviations can begin with capital letters. Sometimes it is merely a matter of the author's choice, but sometimes ker and Ker (for example) will stand for two different types of kernel, in which case the typesetter should be warned.

TABLE 5

Functions and Operators Commonly Set in Roman Type
(words in parentheses give the meaning of the abbreviated form)

ad	(adjoint)	lim inf	(limit inferior)
Ai	(Airy function)	lim sup	(limit superior)
arg	(argument)	ln	(logarithm)
Bd	(Bound or boundary)	log	(logarithm)
cl	(closure)	Log	(principal log)
coker	(cokernel)	lub or l.u.b.	(least upper bound)
cos	(cosine)	max	(maximum)
cosh	(hyperbolic cosine)	min	(minimum)
cot or ctg	(cotangent)	mod	(modulus)
coth	(hyperbolic cotangent)	pt	(point)
det	(determinant)	Pr	(probability)
dim	(dimension)	P	(property)
exp	(exponential)	Re	(Real)
g.c.d.	(greatest common divisor)	sin	(sine)
GL	(General Linear)	sinh	(hyperbolic sine)
glb or g.l.b.	(greater lower bound)	SL	(Special Linear)
gr	(group)	sp	(spin or linear span)
grad	(a vector operator)	Sp	(Symplectic)
hom	(homomorphism)	sup	(superior or supremum)
id	(identity)	Sz(g)	(Suzuki group)
Im	(Imaginary)	tan	(tangent)
inf	(inferior or infimum)	tanh	(hyperbolic tangent)
int	(interior)	tr	(trace)
ker	(kernel)	w	(weak star)
lim	(limit)	wr	(wreath)

Functions, such as lim, max, sup, lim inf, and lim sup are often accompanied by a limit that is set as a subscript. Note that in text the subscript follows the functional expression that is set in roman, while in display it is set as indicated below:

IN DISPLAY:	$\lim\limits_{a\to 0} an^2$	IN TEXT:	$\lim_{a\to 0} an^2$
	$\lim\limits_{n\to\infty} \sup\limits_{\phi\in\Phi}$		$\lim_{n\to\infty} \sup_{\phi\in\Phi}$
	$\limsup\limits_{n\to\infty}$		$\limsup_{n\to\infty}$

The copy editor should mark the limits for correct positioning.

2.4.6 Embellished letters (dots, bars, etc., over and under letters)

2.4.6a Embellishments over single letters

Embellishments over single letters are often used; the following are acceptable.

$$\dot{a},\ \check{a},\ \hat{a},\ \ddot{a},\ \bar{a},\ \tilde{a},\ \vec{a},\ \acute{e},\ \grave{e}$$

These should be identified the first time they occur in the manuscript if notation is being listed for the compositor. An arrow over a symbol usually represents a vector. See §2.4.8a for alternative notation.

Double embellishments over letters should be used rarely. They may not center well over the letter. In text they may interfere with a hanging letter (like y) or a subscript from the line above, though with computer-generated output using programs like TEX, the lines of text will spread to prevent overprinting, sometimes spreading imperceptably. Originally the double embellishments may have been used in place of an unavailable font (like boldface) and should be replaced by that font whenever possible.

2.4.6b Embellishments under letters

Bars under letters are usually acceptable, but with some typesetting systems, they might interfere with letters like g which hang low. In those cases it is a good policy to avoid the underbars to prevent overprinting. With TEX the underbars do not present a problem unless extra leading between the lines is not allowed. TEX will easily set the underbar and stretch the leading if necessary.

Alternative notation. A subscript can be substituted for an underbar; if there is a parallel construction between overbars and underbars, a corresponding superscript may be used to indicate the overbar. Embellishments over symbols may be replaced by superscripts following the symbol. Minus signs and tildes are often used for this purpose. See Appendix A for additional suggestions.

Except for the vector notation or underlined letters, the copy editor usually consults the author before using one of the alternative notations suggested.

INSTEAD OF	CAN USE
$\tilde{A}$	A' or A'' or $A^{\sim}$
$\underline{A}$ and $\overline{A}$	A_* and A^* or A^- and A_-
$\dot{\tilde{A}}$	$\dot{A}^{\sim}$ or $\tilde{A}'$

2.4.7 Braces, tildes, carets, and bars over groups of letters

2.4.7a Braces, tildes, and carets over groups of letters

Expressions embellished by braces, tildes, and carets will cause the lines of text to spread. Consult the author concerning alternative notations. Even TEX will produce output that might not be desirable or that is not always acceptable. The following are some alternatives.

CHANGE $\widehat{F(x)}$ TO $F(X)^{\wedge}$

CHANGE $\overbrace{A + B}^{\sim}$ TO $(A+B)^{\sim}$

2.4.7b Bars over groups of letters

These appear in display and in text. In text, however, they may interfere with subscripts from the line above unless the lines of text are allowed to spread. Overbarred groups of letters were an irritating problem with Monotype composition, but they are easier to handle with phototypesetting and are no problem for TEX. This is fortunate, because authors use them frequently and strongly resist substituting another notation.

2.4.8 Miscellaneous notation changes

2.4.8a Vectors

An arrow over a letter is used to mean a vector. This notation can be replaced by a boldface letter.

REPLACE $\vec{a}$ BY $\mathbf{a}$.

2.4.8b Radical signs

Expressions like $\sqrt{x+1}$ involve a long bar over a group of letters, a notation which in the past was avoided whenever possible. Happily it can be set easily by some modern composition methods. If your compositor cannot set the radical, here are some alternatives.

CHANGE	TO
$\sqrt{a-b}$	$(a-b)^{1/2}$
$\sqrt{x}n$	$x^{1/2}n$
$\sqrt{xn}$	$(xn)^{1/2}$
$\dfrac{a}{\sqrt{x-y}}$	$\dfrac{a}{(x-y)^{1/2}}$ or $a(x-y)^{-1/2}$
$\sqrt{\sum_{a=1}^{b} x}$	$\left(\sum_{a=1}^{b} x\right)^{1/2}$

2.4.8c Binomial coefficients

The binomial coefficient is often written as $\binom{n}{r}$, which, as can be seen in this printed paragraph, requires spreading of lines when used in text. To avoid spreading lines of text the symbols are sometimes set in the same size as indices so that the expression looks like $\binom{n}{r}$.

INSTEAD OF	USE
$\binom{a}{b}$	$\binom{a}{b}$

An alternative to such substitutions is to display every occurrence of the binomial coefficient, practical only if there is a limited number of them. When displaying such expressions, do not use the smaller size.

2.4.8d Matrices

Unless the publisher allows spreading of lines in text, matrices must almost always be set in display. Even if the lines are allowed to spread, only the most simple matrices should be set in text. For example, although the matrix $\left(\begin{smallmatrix} a & b \\ c & d \end{smallmatrix}\right)$ can be set in text as shown here, it would be displayed, often out of necessity, had the elements included superscripts or subscripts. But even when they can be typeset in text, readability may dictate that they be displayed.

Matrices are set in columns and rows in a rectangular array. The symbols must be copyedited so that there is no doubt on the part of the compositor as to the positioning of each symbol.

EXAMPLES:

$$\begin{bmatrix} a_1 & a_1+b_1 & a_1+b_2 & a_1+b_3 \\ a_2 & a_2+b_2 & a_2+b_3 & a_2+b_4 \\ & \vdots & \vdots & \vdots \\ a_n & a_n+b_n & a_n+b_{n+1} & a_n+b_{n+2} \end{bmatrix}$$

$$\begin{bmatrix} a_1 & a_1+b_1 & a_1+b_2 & a_1+b_3 \\ a_2 & a_2+b_2 & \ddots & \vdots \\ \vdots & \vdots & & \\ a_n & a_n+b_n & \cdots & a_n+b_{n+2} \end{bmatrix}$$

A *determinant* is set up in the same manner as a matrix except that straight lines are used instead of brackets.

EXAMPLES:

$$\begin{vmatrix} a_1 & b_1 & \cdots & f_1 \\ \vdots & \vdots & & \vdots \\ a_m & b_m & \cdots & f_m \end{vmatrix}$$

2.4.8e Blackboard boldface ($\mathbb{A}$, $\mathbb{C}$, etc.)

Letters with double backs are the mathematician's way of making boldface letters on the blackboard. Compositors are usually able to produce these blackboard boldface letters. However, when the blackboard boldface font is not available at the compositor, the manuscript is often marked for a boldface letter, not a special notation.

2.4.8f Ampersand (&)

Replace & by the word "and" when used in the nonmathematical text. Leave it alone when it is used as a mathematical symbol.

2.5 MATHEMATICS IN DISPLAY

Among the tasks of the copy editor is that of deciding whether displays should be left as on the typed manuscript or if they should be run into the text, slashed, or rearranged. Some authors tend to display indiscriminately without regard to the importance or length of the mathematical expressions; these can often be changed without sacrificing clarity. For manuscripts prepared electronically by authors for publication by the AMS, displays are generally left as is unless there is an excessive number of small, unnecessary displays.

On the other hand, it is sometimes necessary to break up a paragraph that contains a lot of mathematics to avoid bad breaks or to make the contents more comprehensible.

Use of the suggestions given in this section may depend on the method of composition. As mentioned in §2.1.6, displayed material is not necessarily expensive to set—but it may be. In any case displays add to the number of pages in a paper (and to the printing cost) because of the blank space around them.

2.5.1 Running in displays

Elimination of displays by running them into text may be an effective method of reducing costs by cutting down on the number of pages to be printed. In many instances equations are fully as clear without display. Some authors overuse displayed expressions, with a resulting loss of emphasis for significant material. On the other hand displays cannot and should not be eliminated entirely, because they may be essential to clarity, emphasis, and/or parallel construction. It is seldom worthwhile to run a long or complicated expression into the text unless there are several obvious points at which it may be broken. A change in displayed material should be designated by a copy editor who has either a mathematical background or considerable experience with mathematical manuscripts. If done with discrimination, authors seldom object.

2.5.2 Slashing stacked fractions

Changing a stacked fraction to a one-line fraction in display may save nearly one-half of the space required for the mathematical expression. This is illustrated below by showing the following set of equations in three different ways.

(a) Display as it would appear if set as the author submitted the manuscript.

$$\psi_1(\theta) = \frac{(m-1)}{p}\psi(\theta),$$
$$\psi_2(\theta) = \frac{(p-m+1)}{p}\psi(\theta),$$
$$t_k = \log R_k - \frac{\log R_1 + \cdots + \log R_k}{k},$$
$$\sin t_n = \sin \frac{\log \mu(r)}{\nu(r)},$$
$$\sin \frac{\log R_n}{\log n} = \sin \frac{\log r}{\log \nu(r)} = \frac{1}{\rho},$$
$$\frac{zg'(z)}{g(z)} = 1 + \frac{z\zeta''(z)}{\zeta'(z)} = f(z)$$

(b) The manuscript as it would have looked if a copy editor had marked it for the elimination of stacked fractions (note additional parentheses and slashing lines which have been put in by hand).

$$\psi_1(\theta) = \frac{((m-1)}{p)}\psi(\theta),$$
$$\psi_2(\theta) = \frac{((p-m+1)}{p)}\psi(\theta),$$
$$t_k = \log R_k - \frac{(\log R_1 + \cdots + \log R_k)}{k},$$
$$\sin t_n = \sin\frac{((\log \mu(r))}{\upsilon(r))},$$
$$\sin\frac{(\log R_n}{\log n)} = \sin\frac{(\log r}{\log \upsilon(r))} = \frac{1}{\rho},$$
$$\frac{zg'(z)}{g(z)} = 1 + \frac{z\zeta''(z)}{\zeta'(z)} = f(z)$$

(c) Display as it would appear if set according to the copy editor's directions given in (b). Note that the space has been reduced significantly.

$$\psi_1(\theta) = ((m-1)/p)\psi(\theta),$$
$$\psi_2(\theta) = ((p-m+1)/p)\psi(\theta),$$
$$t_k = \log R_k - (\log R_1 + \cdots + \log R_k)/k,$$
$$\sin t_n = \sin((\log \mu(r))/\nu(r)),$$
$$\sin(\log R_n/\log n) = \sin(\log r/\log \nu(r)) = 1/\rho,$$
$$zg'(z)/g(z) = 1 + z\zeta''(z)/\zeta'(z) = f(z)$$

This is an extreme example; perhaps a bit of clarity is lost. In such cases the individual technical editor has to make a subjective decision: Does the loss of clarity outweigh the economy of space?

2.5.2a Avoiding pitfalls in slashing of displays

(a) Do not slash an expression if the result is that a one-line equation will require two lines; clarity may be lost while there is little or no saving in either typesetting time or space.

(b) Do not slash a fraction if other components of the equation which are on the same line require two or more lines.

EXAMPLES: Do not slash the fractions shown below.

$$\frac{n}{2}\int_a^b x\,dx \qquad \frac{a}{x}\sum_0^1 x$$

(c) If it is a matter of cost or clarity of mathematical expression, choose clarity. For example, *do not slash* the expression shown in this example because in the slashed form it is difficult to follow.

STACKED:

$$\frac{(a_1 + ia_2) + (a_{11}s_1 + a_{21}s_2)}{(b_1 + ib_2) + (b_{11}s_1 + b_{21}s_2)}$$

SLASHED:

$$((a_1 + ia_2) + (a_{11}s_1 + a_{21}s_2))/((b_1 + ib_2) + (b_{11}s_1 + b_{21}s_2))$$

(d) Before making drastic changes in the manuscript, consult the author. This could save expensive corrections at the author proof stage and some aggravation! A moderate amount of slashing and transposing can probably be left to the discretion of a good copy editor, but check any change of notation with the author. Form letters are useful for this purpose because they make letter writing less time consuming. Form letters can be sent in e-mail to save even more time.

2.5.3 Moving sections of a display

If two or more short equations are each displayed on different lines by the author, space is saved with no loss of clarity if they can be printed on the same line. It is well in such cases to indicate to the compositor that a rather large space (probably a two-em quad[1]) should be left between them in order to make it very obvious that they are separate equations.

Two parts of the same equation can often be put on one line instead of two lines. Given below are examples of equations that are just as clear when displayed on one line.

$$\sum_{i=1}^{n}\frac{1}{n_i} \geq \sum_{n=3}^{n}\frac{k_n}{2^{n-1}} \qquad = 2^r\sum_{i=s}^{n}\mu(E_{n_i}) = +\infty,$$

$$R_{hijk} = b_{hj}b_{ik} - b_{hk}b_{ij}, \qquad b_{ij,k} = b_{ik,j}$$

[1]See §3.1.1 for definition of a two-em quad

2.6 ENGLISH USAGE

This is just a brief guide for use in copyediting mathematical manuscripts. All rules of good grammar and correct punctuation apply to a mathematical manuscript, and the author should make the manuscript correct in these matters. The copy editor's task is to make the manuscript consistent and to change obvious errors that have not been fixed by the editor or the referee. For this purpose, the copy editor should have on hand a good dictionary and books on English usage and rules of punctuation. Suggestions are given in the bibliography (see [**20**], [**21**], [**22**]).

Mathematics is written in sentences. Often the subject or the verb of the sentence is a mathematical symbol rather than a word. Copyediting, therefore, requires the ability to determine which part of speech is represented by the various symbols. In §3.2.1 there is a listing of mathematical symbols according to their grammatical function.

EXAMPLES:

$$A = B + C.$$

The example is a complete sentence with A, B, and C acting as nouns, $+$ as a conjunction, and $=$ as the verb. This is, of course, a relatively simple example but the same principles apply to the more complicated situations.

Authors of mathematics almost invariably write in sentences but sometimes do not punctuate correctly. Although it is not universal practice to punctuate various sections of a display, it often adds to the clarity of the writing. For the most part in AMS publications, mathematical equations are punctuated, with the occasional exception of diagrams, matrices, and determinants. For example, when several separate equations are displayed, it is AMS practice to separate them by inserting a comma or other appropriate punctuation at the end of each line of the display.

When the mathematics in a paragraph is abundant, punctuation needs to be considered with more care than usual. A common mistake, for instance, is for an author to neglect to punctuate an equation that comes at the end of the typed line in a manuscript, even when the next line begins with a separate equation. As an example note what happens to the following manuscript when a comma is left out at the end of the line.

If the manuscript reads

```
As a special case we have Ax^2 + Bx + C = n
x>0.
```

it might be typeset to read

As a special case we have $Ax^2 + Bx + C = nx > 0.$

Specific suggestions are made in the sections below concerning spelling and punctuation. To help a copy editor maintain consistency in punctuation, several guidelines based on AMS practice are proposed; another publisher might well use different criteria. Rules of grammar are not cited because their use in writing mathematical research is no different from their use in other types of writing.

In general, the copy editor should make the manuscript correct if the grammar or punctuation is definitely wrong. In cases where there is

more than one correct method, the copy editor sometimes must make a choice to maintain consistency. Care must be taken that changes to the manuscript involve only the English and not the mathematical meaning of the material. A change in a comma or word can sometimes mean the difference between a correct and an incorrect statement.

2.6.1 AMS editorial-light guidelines

Influenced by the requests of authors to copyedit their electronically prepared manuscripts as lightly as possible, the AMS has developed editorial-light guidelines that are used on both electronic submissions and on papers keyed at the AMS. As mentioned in §2.1, the AMS performs proofreading and copyediting in one step, using these guidelines. Two overlying rules that summarize our relaxed guidelines, used in conjunction with the editorial-light guidelines, are "If it's not wrong, don't change it" and "If it can go either way, leave it."

Editorial-light Guidelines

1. Along with the relaxed guidelines, do the following:
   (a) Correct spelling.
   (b) Correct grammar.
   (c) Change punctuation only if there is a grammatical error.
   (d) Check/correct numbering systems.
   (e) Check/correct text cross-references to the numbering systems.
   (f) Check/correct text cross-references to the bibliography.
   (g) Correct/query unclear wording.
   (h) Query mismatched fences.
   (i) Query missing superscripts and subscripts.
2. Also do the following:
   (a) Leave "roman expressions" as submitted in electronic files by the authors (roman or italic).
   (b) Leave displays as aligned and broken in electronic submissions unless they overrun the line.
   (c) Use your judgment and consult with your supervisor when in doubt about widows and orphans (TEX penalties should cause these to occur almost never).
   (d) Do no work on references except to correct typos, correct author names, update "to appear" and "preprint" entries, add the book or journal series name and volume number for a translation that has since appeared, and add MR/CMP numbers (the MR number will serve as a link to MathSciNet in the electronic version of our journals on the Web). If a reference has no MR or CMP number, edit it to the point of making it useful to the reader, but do not give it a full, traditional edit.
   (e) Figures in electronic submissions are not to be moved for optimal positioning relative to text reference unless their positioning as submitted seriously detracts from the paper.
   (f) Leave running heads as submitted in electronic files unless they overrun the line or overprint the folio (page number).

These guidelines have been received well by AMS authors. In conjunction with the use of style files, the result is still nicely formatted mathematics, with consistency within articles.

2.6.2 Spelling

A good dictionary should be used as the basic authority for spelling. If the dictionary being used gives more than one acceptable spelling, the author should be given a preference. If a revised version of the dictionary has new spelling rules, the copy editor must make a decision. One suggestion is to use the traditional spelling if the author uses it consistently; if the author is inconsistent, keep up with the times and use a correct spelling from a recent edition. For example, the hyphen in "co-ordinate" was dropped between the sixth and seventh editions of *Webster's New Collegiate Dictionary*. The suggested rule allows either spelling but, if the author is not consistent, choose "coordinate".

2.6.2a British spelling

It seems sterile to make the English of mathematicians educated to British usage conform to a predetermined American standard, even though the publication is American. The suggestion is, therefore, to allow either American or British usage in order to preserve some of the flavor (or flavour) of the author's background. But consistency is a must. Some British spelling commonly used in mathematics is "fibre" (for fiber) and "centre" (for center).

2.6.3 Commas

There seem to be at least two schools of thought on commas. One inserts a comma wherever there is the slightest pause; the other leaves it out unless it is absolutely necessary to the sense of the sentence. As a rule, the copy editor should follow the tendency of the author. If, for example, the author wants to place commas around every occurrence of "e.g.", they are correct and should be left. If he always leaves them out, that is also acceptable. However, if the manuscript is so liberally sprinkled with commas that there is no flow of thought, the copy editor should judiciously remove the more obviously misplaced ones. If the author avoids commas by eliminating them where there are no significant pauses, that is fine unless the omission causes misreading.

A frequent misuse of the comma in mathematics manuscripts is its placement either before or after a descriptive clause or phrase but not in both places. The copy editor of mathematics should remember that commas are often used in pairs, just as are parentheses or brackets.

DO WRITE: John, even though wearing a business suit, looks sloppy.

DO NOT WRITE: John, even though wearing a business suit looks sloppy.

DO WRITE: $a_x = b,\ x > 1,$ is a class of functions.

DO NOT WRITE: $a_x = b,\ x > 1$ is a class of functions.
OR: $a_x = b\ x > 1,$ is a class of functions.

The use of only one comma in each of the last two examples is definitely wrong because the condition of $x > 1$ separates the subject of the sentence from its verb; two commas are needed to set off the parenthetical expression.

2.6.4 Quotation marks

The fact that traditional usage of quotation marks does not always follow logical placement causes special problems in mathematics. Since punctuation, like grammar in general, is in a constant state of flux, no one rule can be given to cover all cases. In general, mathematicians are probably hastening the process toward placing quotation marks logically.

Traditional usage of quotation marks with a comma:

In the paper entitled "Solutions of $x^3 = A$," A is the...

Logical usage of quotation marks with a comma:

In the paper entitled "Solutions of $x^3 = A$", A is the...

2.6.4a Commas and periods

Although some compositors might place these *inside* the closing quotation marks, there is authority for allowing commas and periods to be placed in the logical position in specialized work in which clarity is especially important. Leave commas and periods as on the manuscript unless the manuscript is not consistent. When editing for consistency, place commas and periods in the logical position if mathematical expressions are involved.

2.6.4b Colons and semicolons

Predominant usage is just the opposite of that for commas and periods; the punctuation is always outside the quotation marks.

2.6.4c Question marks and exclamation points

These are placed *inside* or *outside* the quotation marks, according to whether they are related to the quoted matter or to the whole sentence or clause that includes the quotation.

2.6.5 Hyphens

No two dictionaries would completely agree as to advice about hyphens. It is more or less generally agreed, however, that the hyphen should not be used as an ornament but as an aid to understanding. The primary function of the hyphen is to link two words together when it is logically absurd to read them as separate words. Leave out a hyphen if its elimination does not change the meaning or lead to ambiguity. Current AMS practice is to leave hyphenation as supplied by the author, fixing just occasional inconsistencies or expressions that lead to ambiguity or confusion.

Here are some rules regarding use of hyphens. However, if a paper has been entirely typeset in violation of any of the following suggested rules, it is probably not worth changing.

2.6.5a After a prefix

The hyphen is omitted after a prefix unless it would form a diphthong with the terminal vowel of the prefix or suggest mispronunciation. Table 6 contains a list of prefixes often used in mathematics. A prefix is listed in the first column with or without a hyphen, whichever is normal practice. Words in parentheses are exceptions.

TABLE 6

Prefix	Exceptions
ante	Hyphenate if there is a double e.
anti	Hyphenate if there is a double i (anti-isomorphic).
bi	Hyphenate if there is a double i (bi-invariant).
co	When followed by another o, it is preferred that the hyphen be omitted; but if the author wishes, he may use the hyphen (co-ordinate, co-operation).
eigen	
non	Hyphenate when followed by a proper name (non-Riemannian).
pre	Hyphenate when followed by a proper name (pre-Hilbert).
pro-	
pseudo	Hyphenate if there is a double o.
quasi	quasi may be used as a word by itself.
re	Hyphen possible but not necessary when followed immediately by an e.
self-	(selfadjoint)
semi	Hyphenate if there is a double i.
sub	

2.6.5b With descriptive adjectives

(a) When two or more descriptive adjectives which could modify a noun separately are not so applied, they should be hyphenated when they precede the noun. For example, in the term "finite dimensional space" "finite" could modify "space", but ordinarily what is meant is a "finite-dimensional space"; the adjectives should, therefore, be hyphenated. Other such cases are

one-dimensional well-known left-hand
right-hand well-defined

(b) One-to-one is a common expression that is always hyphenated.

(c) When two or more unit modifiers have the same base, use a hyphen after each element dependent on that base, for example, "3-, 4- or n-sided polygons" and "W- and Y-semigroups".

2.6.5c Triple words

Follow a prefix with a hyphen if it might change the meaning of a word in three parts:

the space is nonsimply connected a non-simply-connected space
non-null-homotopic non-nilpotent

2.6.5d Elimination of hyphens

It is usually the author's, not the copy editor's, prerogative to make such changes, but it is occasionally in the best interest of good exposition to eliminate some of the hyphens.

CHANGE	TO
non-simply-connected	not simply connected

2.7 ADDITIONAL COPY MARKING RULES

2.7.1 Leading (space between lines)

The word "leading" originates from the practice in hot metal composition of inserting a piece of lead between lines of type to produce space. Today leading is largely taken care of by computer programming and by the specifications built into style files. Leading may, for example, be inserted around enunciations, such as theorems and corollaries, and before sections. It may or may not be desired around definitions or examples. Whatever the policy, it should be definite and comprehensible to the compositor.

2.7.2 Insertions and deletions

There are several "do's" and "do not's" listed below which should be observed by copy editors. The reason for observing these rules is quite simple. The compositor has a copyholder for the manuscript similar to that sometimes used by typists. The copy is inserted, then rolled to the line being set. If an insertion is lower than the line in which it is to be placed, the typesetter has to roll the holder up and down, a time-consuming process. Similar problems arise if staples are used in the manuscript, if corrections are written lengthwise on the manuscript, or if insertions are made on separate pieces of paper.

Do make short insertions *above the line* in which they are to be placed.

Do not write insertions along the vertical edge of the manuscript page.

Do cut and paste an insertion of several lines or short paragraphs into the manuscript in the proper place rather than inserting a separate sheet of paper. For longer insertions cut the manuscript into short pages rather than have the compositor shift pieces of paper back and forth.

Do not use staples on the manuscript for the compositor. Cut and paste strips that need to be added.

Do erase or cross out deletions from the manuscript in such a manner that it is obvious that the deleted section has been eliminated.

3

Mathematics in Print

Chapter 2 involved primarily the marking of typed manuscript for the compositor's use. This chapter is concerned with how mathematics should look when it has been typeset, that is, how it is spaced in print. The information in this chapter will be especially important to authors preparing manuscripts electronically, as well as to copy editors, proofreaders, and compositors working from traditionally prepared manuscripts. If the rules presented in this chapter are followed carefully, there could be considerable time and publishing costs saved in correcting first proof produced by the compositor and in refining electronically prepared manuscripts in places where ambiguity and inconsistency appear.

Even if the traditionally prepared manuscript is typed approximately as the mathematics should appear in print, there is still a great deal of know-how necessary to produce printed copy with proper space between symbols and letters used as variables, with equations broken in the proper places, and with displays centered in readable form. Experienced keyboarders produce properly spaced and properly displayed mathematics almost automatically, but anyone who has ever worked with a compositor who is not an expert on mathematical work will appreciate how innumerable are the types of errors that can be made.

The author or the proofreader with a strong background in mathematics reacts almost automatically to spacing and formatting errors, but many new proofreaders are not familiar with mathematical notation and need guidance and rules to follow in determining the correct setup of mathematics. Breaking of equations and the setup of displays is especially difficult for many proofreaders.

3.1 SPACING BETWEEN SYMBOLS IN MATHEMATICS

The first step in learning how mathematics should look in print is to learn how much space is allowed between individual symbols and groups of symbols. Rules for spacing are given below, starting with definitions of the various space sizes, referred to throughout the chapter.

3.1.1 Space sizes defined

The size of the various spaces used in mathematical expressions depends on the size of the type font. The need for a variable unit of space is supplied by the "em", also known as the "em quad", which is a dimension

equal to the type size and is generally considered to be roughly the width of a capital M.

Space	Editorial Marking	Size
Thin space	usually not marked by the copy editor	1/6 of an em quad
Thick space		1/3 of an em quad
Em quad		Square of the type size
Two-em quad		Twice an em quad

3.1.2 No space

Between two symbols and between a number and the symbol it multiplies:

$$ab \qquad xy \qquad 2a \qquad 2xz \qquad 4\alpha\beta$$

Before and after subscripts, superscripts, parentheses, braces, brackets, and vertical rules:

$$2x^2y_3z \qquad (x)y \qquad a\{b\} \qquad y[a] \qquad a|x| \qquad b\|y\|$$

In expressions in the subscript or superscript:

$$\lim_{a\to 0} \qquad a^{n-1}$$

3.1.3 Thin space

This spacing is inserted automatically by the compositor and does not need to be marked by the copy editor; and in all but one or two of the places marked with the thin space symbol in this chapter, TEX has spacing built in (in some cases TEX uses thick spaces instead of thin spaces; the width of a TEX thick space is slightly less than the value shown in §3.1.1). The proofreader, however, needs to be aware of the proper spacing. In the examples that follow, marks the places where there is a thin space.

3.1.3a

Before and after symbols used as verbs:

$$= \quad \neq \quad \equiv \quad \not\equiv \quad \div \quad \sim \quad \approx \quad \cong \quad \not\sim \quad \to \quad < \quad > \quad \leq \quad \geq$$
$$\ll \quad \gg \quad \not< \quad \not> \quad \subset \quad \supset \quad \in \quad \notin \quad \subseteq \quad \supseteq$$

(Some compositors use a thick space in display but none in text; others use no space in either place. It is usually advisable to let the compositor use his customary style.)

$$a = b \qquad a \neq xy \qquad a \in M \qquad x \subset y \qquad 0 < y \leq x$$

3.1.3b

Before and after symbols used as conjunctions:

$$- \quad + \quad \pm \quad \times \quad \dot{+} \quad \cup \quad \cap \quad \vee \quad \wedge \quad \circ \quad \otimes \quad \oplus$$

$$a - b + c \qquad x + y \qquad x \circ y$$

3.1.3c

Before but not after

$$+ \quad - \quad \pm \quad \mp$$

when used as adjectives:

$$-x(a+b) = -2 \qquad y = \pm 3$$

3.1.3d

After the commas in sets of symbols, sequences of fractions, and coordinates of points:

$$x_1, x_2, \cdots, x_n \qquad \frac{x}{a}, \frac{y}{b}, \frac{x}{c}, \cdots, \qquad (1,2) \qquad (a,b,c)$$

3.1.3e

Before and after the symbols of integration, summation, product, and union:

$$a \int x\, dy \qquad \liminf_{c \to p} \sum_{n=p}^{\infty} f^{(n)}(c) \qquad \prod ah \qquad a \cup (a+b)$$

The thin space between x and dy in the first expression above is *not* built into TEX.

3.1.3f

Before and after functions set in roman type (see Table 5 for a list of these abbreviations):

$$a \sin x \qquad a \liminf p \qquad 2 \tanh \theta \qquad \log x \qquad \exp a^n \qquad \log \log x$$

Exceptions: If any of these functions are preceded or followed by parentheses, braces, brackets, or bars, then the space is eliminated:

$$\exp(ab) \qquad \tan\{a(n)\} \qquad [(a+b)^2 + ab] \sin a \qquad \log |a|$$

For use of "mod", see §3.1.4a and §3.1.5a.

3.1.3g

Before and after vertical rules appearing singly rather than in pairs; the same rule holds for a colon that is used as a mathematical symbol rather than as punctuation:

$$a \mid b \qquad as : a \in A$$

3.1.3h

Before back subscripts:

$$a_2 xb \qquad a_0 x_1 bh$$

The thin space between a and the following back subscript on x in these two examples is *not* built into TEX.

3.1.3i

Before and after ds, dp, dx, and similar combinations of d and another symbol following:

$$\int f(x)\,dx \qquad \iiint dr\,d\theta\,dr$$

As mentioned in §3.1.3e, the space before the d's in these expressions is *not* built into TEX. In the second expression, the space before the first d is provided by the space that follows the $\int$ automatically.

3.1.4 Thick space

This spacing is usually marked with a # by the copy editor if a mathematics expression is involved. Compositors usually work on the premise that no space should be inserted before or after a parenthesis. In cases like the following where additional space is needed, the copy editor should mark for a thick space.

3.1.4a

Before the parenthesis in congruences in text:

$$y = a\#(\mathrm{mod}\ x)$$

3.1.4b

Before a mathematical condition in text:

$$t_n\#(n = 1, 2, \ldots)$$

3.1.5 Em quad (□)

This spacing is used only in displays. Although the compositor usually inserts this automatically, it is often wise for the copy editor to indicate it. In text, regular word spacing, which is variable, is used in similar situations. In the examples a □ is used to indicate a place where an em quad is used in display.

3.1.5a

Between a symbolic statement and a verbal expression in displayed expressions:

$$b = 0 \#(\text{mod } q) \square \text{ for some } q$$

$$E_n(t) \to e^{-t} \square \text{ as } t \to \infty$$

3.1.5b

Around conjunctions:

$$x(a+b) \square \text{or} \square y(a-b)$$

3.1.6 Two-em quad (⨶)

This spacing should be marked by the copy editor. In text, variable word spacing is used in these cases.

3.1.6a

Between two separate equations or inequalities in the same line of a display.

$$x^2 + y^2 = a, \quad ⨶ \quad x + y = b$$

3.1.6b

Between a symbolic statement and a condition on the statement.

$$x^n - y^n - z^n = A \quad ⨶ \quad (n = 0, 1, \ldots, p).$$

3.2 MATHEMATICAL EQUATIONS IN TEXT

There are various schools of thought on the treatment of equations in text. One is that mathematical expressions may never be broken at the end of a line of text. Another is that only the simplest mathematical expressions are allowed in text. The practice traditionally followed at the AMS was to run simple or short equations into text whenever it was possible to do so without sacrificing clarity. With electronic submissions fewer equations are run in, to preserve the original submission and to reduce the number of corrections to the file. This helps to keep publishing costs down.

Copy editors and authors preparing manuscripts electronically must decide how to treat equations. Should they be displayed or run into text? Factors to be considered when making these decisions include

(a) the importance of an equation,

(b) its relation to other displays,

(c) whether displaying an equation will really improve readability,

(d) whether displaying an equation will really save space, because running one display into text might make it necessary to display subsequent material.

For copy editors, making these decisions requires either a background in mathematics or a great deal of copyediting experience and a strong intuitive feeling for mathematics. When bad breaks do occur at the end

of a line of text, it is the task of the proofreader to find them and to suggest alternatives. In the end, the author has the final say.

To guide copy editors and proofreaders who are not familiar with the mathematics involved, as well as authors who are preparing manuscripts electronically, a set of rules regarding the breaking of equations is given in this section. These rules probably cover 98% or even more of the cases that are encountered in research mathematics. However, no matter how many rules are given, there always seem to be places where common sense, based on experience, is needed.

3.2.1 Definitions

Before rules on the breaking of equations can be given, it is necessary to set up definitions to specify exactly which mathematical symbols are involved in the rules.

To simplify the terminology in the rules given in §3.2.2, a set of definitions appears here so that reference can be made to a whole set of symbols by the use of just one or two words. (The examples given here are not exhaustive.)

Operators :

Verbs : $= \neq < > \leq \geq \prec \succ \ll \gg \not\leq \not\geq \subset \supset \in \ni \equiv \not\equiv \sim \not\sim$
$\simeq \cong \rightarrow \leftarrow \Rightarrow \Leftrightarrow \notin$

Conjunctions : $+ \; - \; \times \; \dot{+} \; \mp \; \cup \; \cap \; \vee \; \wedge \; \cdot \; \circ \; \oplus \; \otimes$

Fences : $\{ \; \} \; [\;] \; \langle \; \rangle \; (\;) \; | \; | \; \| \; \|$

Nouns : italic, Greek, German, and Hebrew letters; numerals

Sigma-class symbols

Collective signs : $\sum \; \prod \; \bigcup \; \bigcap \; \bigwedge \; \bigvee \; \bigoplus \; \bigotimes$

Integral : $\int$

3.2.2 Rules for breaking equations in text

In the examples which illustrate each rule, a / indicates an allowable break demonstrating the rule which precedes it. Additional examples are given in §3.4.

Rule 1. Equations may be broken before or after an operator that is a verb (or after a comma or semicolon) that *does not* occur between fences:

$$a + b/=/x(c - d)$$

Exception: If lines of text are not justified, the break should be after the operator; this alerts the reader to the fact that the mathematical expression continues.

Rule 2. An equation may be broken at any thick space (see §3.1.4):

$$y = 4n - 1/(n = 0, 1, 2)$$

If there is a choice, Rule 2 has precedence over Rule 1. It is better to break at a thick space than before an operator.

Rule 3. After a collective sign, no break is allowed until an operator occurs outside of fences:

$$\sum(a-b)\Big/+\Big/abc$$

Rule 4. After an integral sign ($\int$), no break is allowed until a d occurs; then break after the next punctuation or at a verb.

$$\int a\,dx,\Big/\quad\int a(a+b)(xy-w)\,dx\Big/=$$

Exception : $\int dx+dy$ (NO BREAK ALLOWED)

Rule 5. When a set of fences is followed directly by another set of fences, the equation may be broken between them, provided a times sign or a center dot is inserted:

$$(a+b)\Big/(c+d)$$

(Break at / and insert a times sign or a center dot, as appropriate, before the second set of fences.)

Exceptions: (1) This rule does not apply if the fences are preceded by a sigma-class symbol.

(2) Do not break at the slash (/) in a slashed fraction.

(3) This rule does not apply to logic.

Rule 6. Equations may be broken before or after an operator (or after a comma or semicolon) that occurs between fences if both of the following conditions are present:

(1) if one of the opening fences (that has not closed) is *not* preceded directly by a noun, a fence, or sigma-class symbol and

(2) if the subsequent closing fences are *not* followed directly by a noun or a fence.

It is good policy, however, to avoid breaking equations between fences whenever possible.

NO BREAK ALLOWED:

$$x(a+b+c)\qquad(a+b-c)y\qquad\sum(a+b-c)$$

BREAK ALLOWED, WHEN NECESSARY:

$$(a\log x\Big/-b\sin(x/y))\qquad((\sin a-\cos b)\Big/+\tan c\Big/-(xy\cos b))$$

Rule 7 (for mathematical logic). The rules for breaking mathematical expressions in logic are not always the same as for other branches of mathematics. Generally, expressions should not be broken within fences and should be broken before verbs and conjunctions. In logic & and $\rightarrow$ have more weight than in other mathematics fields. Considering the English equivalent of some symbols might help the compositor or proofreader in making correct breaks.

$\Rightarrow$ and $\rightarrow$ mean *implies* $\Leftrightarrow$ means *if and only if*

& and $\wedge$ mean *and*; $\vee$ means *or*. All three are conjunctions which might take precedence over a verb for breaking purposes.

$\neg$ means *it is not true that*; $\exists$ means *there exists*; $\forall$ means *for all*. Breaks occur before rather than after these symbols.

Do not use either a times sign or a center dot when breaking at a fence; break without any added notation.

$$s = 0 \,/\&/\, V = 0 \qquad e^* = q(u) \,/\!\rightarrow/\, u = M(e^*, t)$$
$$\alpha \in Q \,/\wedge/\, \beta \in Q \,/\wedge/\, \alpha \neq \beta \,/\!\rightarrow/\, (\exists m) F(\alpha(m), \beta(m))$$

Note that in the mathematical logic examples above, it would be wrong to break at the $=$, $\neq$, or $\in$ signs.

3.3 MATHEMATICS IN DISPLAY

Mathematical equations are set into display rather than into text for several reasons; emphasis and clarity are probably the two main factors. Some authors use display with discretion; some run even extremely long, complicated equations into the text, while others tend to display every equation in the paper. The tendency to overdisplay is probably more predominant than the tendency to underdisplay; for this reason it is possible for the copy editor to shorten (and even improve) papers by running displayed material into text as detailed in §2.5.1. On the other hand, there are occasions when the copy editor needs to suggest the display of complicated expressions that have been run into text, particularly when it would involve a bad break at the end of a text line. Numbered equations must always be displayed.

3.3.1 Numbered displays

When displays are numbered, the most common practice is to place this number in parentheses at the margin. Some publishers place them at the left margin, others at the right. As long as a consistent style is used, the placement is not important. The predominant practice among American publishers of mathematics is to place the equation number at the left margin. When a style file is used, placement of the equation number is taken care of automatically.

3.3.2 Centering displays

Most publishers of research mathematics center displays in a manner similar to that related in this section.

Rules. Center a display so that the distance from the left margin to the first symbol is the same as the distance from the right margin to the last symbol. If centering causes an overlap between the display number and the display, the display may be

(1) centered between the display number and the right-hand margin (or left-hand margin, if display numbers are on the right),

(2) centered on a separate line below the display number, or
(3) broken and displayed on more than one line.
EXAMPLES: In this case the display is centered between margins

$$a^n + b^n + c^n + d^n = A + B, \tag{32.21}$$

but here we have a display where this is not possible unless the display is on a separate line, below the display number

(32.21)
$$(a + b) \,/\, (a_{11} + b_{11}) = (a_{22} + b_{22}) - (a_{21} + b_{21})(a_{11} + b_{11}).$$

3.3.3 Centering several one-line equations

Several equations which occur in succession, with no intervening words, are considered one display. In such cases the first verb symbol occurring in each equation is lined up vertically with the one below; the set of equations is then centered.

The first of the verb symbols occurring in each group of equations are lined up vertically; the set of equations is then centered.

$$\int_0^1 (f + g)\, d\phi \le \int_0^1 \phi\, d\phi = \int_0^1 g\, dg + \int_0^1 f\, df,$$
$$\int_0^1 (F - G)\, d\psi = -\int_0^1 (f - g)\, df = 0,$$
$$F \subset f - g.$$

Note that if there is an intervening word, even if it is just the word "and", the word is placed at the left margin and the display is terminated. The material following the word is then centered and aligned independently.

An author may also decide to center each line separately.

$$\int_0^1 (f + g)\, d\phi \le \int_0^1 \phi\, d\phi = \int_0^1 g\, dg + \int_0^1 f\, df,$$
$$\int_0^1 (F - G)\, d\psi = -\int_0^1 (f - g)\, df = 0,$$
$$F \subset f - g.$$

3.3.4 Rules for breaking equations in display

In general, breaking equations in displays follows the same rules as breaking equations in text. However, breaking displays tends to be more difficult because the more complicated material is usually set into display instead of text.

The rules below are based on the definitions and rules from §3.2.1 and §3.2.2. See §3.4 for examples of the application of the following rules.

Rule A. Rules 1–7 in §3.2.2 on the breaking of equations in text apply also to displays.

Exception: In display, equations may be broken before an operator but *not* after an operator.

Rule B. An equation may be broken at any em or two-em quad.

Rule C. Rules 3, 4, and 6 may be disregarded if the mathematical expressions are so long that there is no alternative. Determining where these expressions should be broken requires mathematical knowledge and/or a great deal of experience with mathematical proof.

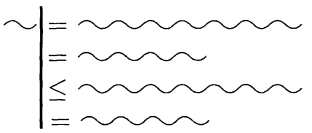
Rule D. The symbols in a matrix or a table should be set in a smaller point size type if they will not fit into the page width. If the matrix is still too long, a direction can be given to the compositor to set it broadside.

3.3.5 Centering multi-line equations

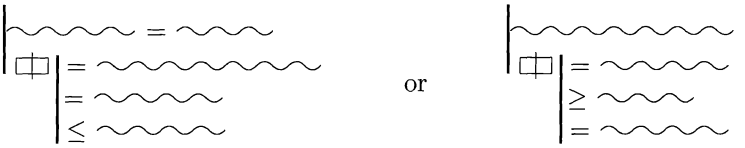
Breaks are made preferably before an operator (verbs and conjunctions).

3.3.5a Break and align on verbs

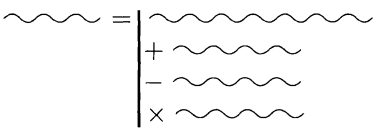
When displayed equations cannot fit within the margins, they should be broken at the verbs (=, $\neq$, $<$, $>$, etc.) and aligned on the verbs.



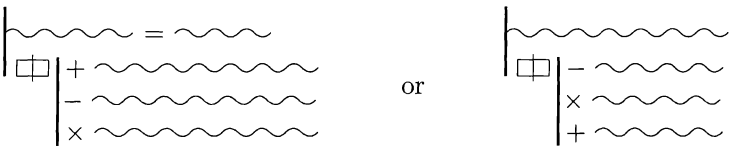
If there is a long expression before the first verb, align succeeding verbs with a two-em quad indent from the left.



3.3.5b Break at conjunctions and align to the right of the first verb

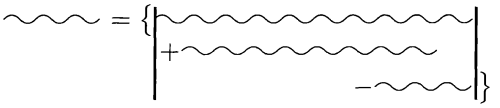


3.3.5c Break at conjunctions and align with two-em quad from left



3.3.5d General rule: always keep expressions visually within fences

If the break occurs within a set of fences, the operator should line up to the right of the opening fence to indicate that this line of display belongs inside the fences.



3.4 TABLE OF RULES FOR BREAKING MATHEMATICS

The rules for breaking expressions in text and in display, illustrated in Table 7, are given in §3.2.2 and §3.3.4.

KEY TO THE TABLE

/ Breaks acceptable in text.

// Breaks acceptable in text and display.

Breaks acceptable in display when other alternatives are not possible.

Breaks not acceptable by any rule. When long and involved expressions occur, it is sometimes impossible to fit them across the page and still abide by all the rules, as seen in this example:

$$\int_U \delta(I)\mu(I) \le \sum_{\mathfrak{D}} \sum_{\mathfrak{D}_{I'}} \Bigg[\int_J \alpha(J')\mu(J') - \alpha(J)\mu(J) - \int_J [\{s(\alpha\eta)(J')\}/\eta(J')]\mu(J') - [\{s(\alpha\eta)(J)\}/\eta(J)]\mu(J) \Bigg] + \Bigg[\sum_{\mathfrak{D}} \sum_{\mathfrak{D}_{I'}} |\alpha(J) - [\{s(\alpha\eta)(J)\}/\eta(J)]|\mu(J) \Bigg] \times \Bigg[\sum_{\mathfrak{D}} \sum_{\mathfrak{D}_{I'}} |\alpha(J) - [\{s(\alpha\eta)(J)\}/\eta(J)]|\eta(J) \Bigg]$$

When none of the rules allow a mathematical expression to fit in a display within the page width, one possible solution is to reduce the expression photographically and paste it onto camera copy or to reduce the expression electronically and pull it in electronically. The result is, of course, to print the elements of the expression in a smaller font. If the entire expression is prepared as a graphic, TEX allows for scaling the graphic at a reduction (and even at an enlargement when desired).

TABLE 7

	RULES THAT APPLY IN TEXT (see §3.2.2)	IN DISPLAY (see §3.3.4)
$a + b/\!/+ c/\!/ = 0$	1	A
$\{a + b/\!/+ c\}/\!/ \in G$	6, 1	A
$\{\phi_i \mid i/\!/= 1, 2, /\!/\ldots, n\}$	6	C
$(\{c_n\}, /\!/\{\lambda_{n+1}\})/\!/ \subset [a, \infty]$	6, 1	C, A
$(a + b + c)/\!/\!(d + e + f)$ (add times sign at break)	5	A
$\{x : \rho(x, H)/\!/< 1/i\}$	6	C
$(a + b/\!/+ c/\!/+ (d + e))$	6	D
$(c + b/\!/+ c(a + b)/\!/+ e(d + e))$	6	C
$\sum_{i=0}^{n} a_i\, f(a + b)/\!/+ [a + d]$	3	A
$\bigcap G \setminus \mathrm{Bd}\, H/\!/ + I$	3	A
$y(a + b)/\!/x(c + d)$ (add times sign at break)	5	A
$x = 4n/\!/+ 1/\!/\,\#\,(n = 0, /\!/1, /\!/2, /\!/\ldots)$ (#= 2-em quad in a displayed equation)	1, 2, 6	B
$\int (a + b)xy\, dx/\!/+ O(y)$	4	A
$\int (a + b + c)/\!/\!(d + e + f)\, dx$ (add times sign at break)		C
$A(a/\!/\!/+ b/\!/\!/+ c)$		[1]
$\sin(\alpha/\!/\!/+ \beta/\!/\!/+ \gamma)$		[1]
$\int (a/\!/\!/+ b/\!/\!/+ c/\!/\!/+ d)\, dx$		[1]
$[a + b/\!/\!/+ c + d]_0^n$		[1]

[1] By necessity, break only in display. No rule applies.

4

Techniques of Handling Manuscript and Proof

Copyediting, proofreading, makeup of pages, and other phases of handling mathematics manuscript and proof are, in many respects, the same as for nonmathematical text (see [**1**] or [**3**]). The phases of the process that are unique to mathematics are emphasized in this chapter, making Chapter 4 particularly useful to production editors, copy editors, and proofreaders new to mathematics publishing. Authors will also find the information in §4.4–§4.6 useful.

4.1 COPYEDITING THE MANUSCRIPT

The purpose and method of copyediting a manuscript are given in Chapter 2. The more routine details of the job are discussed here.

4.1.1 Information sheet

For traditionally prepared manuscripts, some publishers compile an information sheet which is helpful to both the compositor and the copy editor. The amount of information recorded on the sheet varies among publishers, ranging from all mathematical symbols occurring in the paper to just the unusual symbols. Since the information sheet is put together primarily for the use of the keyboarder in identifying symbols, an experienced keyboarder does not need to have commonly used symbols recorded. However, for a book or a long paper being prepared for the compositor, the copy editor might find that a full record of the symbols used is a valuable reference.

Italic and roman letters on the line of printing do not need to be listed on the information sheet; it is assumed by the compositor that they are used in all papers. The following might be listed:

German, Greek, Hebrew, and script letters,
boldface, boldface italic, and blackboard bold letters,
embellished letters,
mathematical symbols, preferably with a code (see Appendix C),
functions consistently set in roman type (see Table 5),
unusual symbols.

In addition to the above, this information sheet may serve as identification for the paper by including the author, title, name of the journal or book series, number of manuscript pages, and information about the running heads.

4.1.2 First editing

As mentioned in §2.1, the AMS combines editing and proofreading into one step. This is possible for several reasons: we have experienced technical typists who are very familiar with mathematical notation; we receive a high percentage of papers submitted electronically; and we edit papers very lightly.

However, the practice of having two (or more) people edit a manuscript for different purposes is still held by some publishers. Traditionally, the first copy editor's job is to go through the manuscript systematically and to perform the operations listed below. The first copy editor is entirely responsible for items 4.1.2a–4.1.2c. The final responsibility for 4.1.2d–4.1.2f is with the second editor, and for 4.1.2g with the production editor.

4.1.2a Fonts and style

Style files normally provide the correct fonts and style for elements in the book or article. When no style file is available, the first editor should mark the font and style of the following elements:

title,
author,
section and subsection headings,
enunciations,
footnotes,
references.

4.1.2b Numbering systems

Check all numbering systems used in the manuscript for consistency, e.g., the numbering of equations, sections, theorems, references, etc. If a number is skipped or used more than once, correct the numbering and all text cross-references to the numbering. Then flag the changes on the manuscript with a query or note to the author. The proofreader will transfer the queries and notes onto author proof.

Confer with an experienced copy editor before spending a lot of time on changes to the numbering system. When changing the numbering becomes very complicated, simply flag the errors, asking the author to make all appropriate corrections to the numbering on author proof. Sometimes it is easier to leave a displayed equation unnumbered, for example, than to retain the number and to make numerous changes to the rest of the text. When appropriate, helpful suggestions and ideas like this one can be conveyed to the author to help avoid corrections.

It is useful to note that numbering errors can be avoided in properly coded files using LaTeX's automatic numbering system.

4.1.2c Information sheet

Compile the information sheet. (See §4.1.1.) Bring problems in notation to the attention of the second editor.

4.1.2d Ambiguous characters

To help avoid confusion for the typists and an inordinate number of corrections on first proof or author proof, mark fonts for the following:

lower case epsilon (§2.3.3),
capital sigma (§2.3.3),
capital pi (§2.3.3),
all "o"'s (§2.3.1),
union signs (∪), etc. (§2.4.4b),
roman notation (§2.4.5).

4.1.2e Handwritten material

Type or clarify any handwritten material that is confusing or ambiguous, and fix illegible notation. This will save corrections at a later stage. Cut and paste inserts, if necessary, to make the text appear in consecutive order.

4.1.2f Notation and graphics

Write to the author concerning problems with notation or graphics. This may require a conference with an experienced copy editor or a technical editor. See §4.6 for more information about graphics.

4.1.2g Footnotes

Check the numbering of footnotes. Add or check any special footnotes that are applicable to the particular publication, e.g., the date on which the paper was received by the editor or the listing of an author's institutional address.

4.1.3 Second (technical) editing

Once a manuscript is marked for the compositor and the notation is listed, the manuscript should be checked a second time. This second editing is best done by a technical editor, i.e., an editor with a mathematical background or considerable editorial experience with mathematical manuscript.

The responsibility for a correctly edited manuscript lies with the second editor. He or she should assume only that the first editor has checked the numbering systems and has listed all obvious notation. The second editor is responsible for both the mathematics and the grammar; if the first editor has incorrectly marked the mathematics, the technical editor is still responsible.

This is probably the most important step in the editorial process. What is missed by the second editor will add to publishing costs because it will mean changes in proof. Actually it is impossible to define precisely all the responsibilities involved in second editing, but the following list may provide initial guidance.

(a) Check that the style has been properly marked.

(b) Be sure that the information sheet makes sense. Spot check from the manuscript if it seems necessary.

(c) Check that the following are marked properly: epsilons, products, sums, union signs, italic "o"'s, roman functions, and slashed expressions. If any typed or handwritten notation is at all questionable, make it clear and check that it appears correctly on the information sheet.

(d) Mark thick spaces, em quads, and two-em quads. (See §3.1.4–§3.1.6.)

(e) REMEMBER! If anything that is wrong, odd, or peculiar is missed, it will be typeset! The keyboarder is not a mathematician; notation so familiar to the technical editor or to the author that its identity is never in question may be illegible to the compositor. Use common sense to pick up unusual or incorrect notation that should be marked, corrected, or brought to the attention of the author.

4.1.4 Manuscript to compositor

When sending a manuscript to the compositor, remember to order the necessary number of sets of first proof. Depending upon the requirements of the particular publisher, sets may be needed for any of the following:

1 for return to compositor,
2 for author (one to keep and one to return to the production editor),
2 for each additional author in case of multiple authors,
1 for each editor,
1 for production editor.

4.2 FIRST PROOF (GALLEY PROOF) AND AUTHOR PROOF

Before computers were used to produce page-length proof, the first set of proof produced by the compositor usually consisted of long sheets of print, known as "galley proof" or referred to simply as "galleys". Today this first set of proof, now generated at the proper page length, is referred to as "first proof".

Some publishers have first proof sent directly to authors by the compositor. The authors then mark corrections and return the proof to the production editor. Other publishers have first proof sent directly to the production editor, who proofreads it. A correction run might be ordered before it goes to the author. Whichever method is used, the authors usually receive two copies of proof, one to return to the production editor and one to keep. The set of proof sent to and returned from the author is referred to as "author proof".

When proof has been thoroughly checked for errors by both the proofreader and the author, the production editor enters all corrections onto one set of proof for the compositor. This step is very important, because if it is done properly, it eliminates ambiguities which might otherwise result in additional errors in second proof.

4.2.1 Marking first proof

Standard proofreading marks are used in marking mathematics. A list of proofreaders' marks and a sample of their use is found in [**3**], [**1**], and Appendixes D and E of this book.

Every correction on first proof must have two marks, one in the text to show where the correction goes and one in the margin to inform the typesetter of the change. The typesetter locates corrections by checking the margins and looks at the text only to find where the corrections belong. An error marked in text but not in the margin will not be seen.

Pencils of different colors may be used for marking errors, particularly if the compositor charges extra for author alterations.

(a) Red may indicate a correction necessary because of a compositor error.

(b) Blue may indicate a correction made in proof by the author.

(c) Black can be used in the margin to indicate material to be typeset, in contrast to the red and blue marks that are directions only.

If the compositor does not distinguish between author and composition errors, there is no need to make any distinction between red and blue marks.

4.2.2 Insertions and deletions

The set of first proof being returned to the compositor should never be cut, stapled, or mutilated in any way. Extensive insertions should be typed either in the margin or on a separate sheet of paper. Deletions should be marked on the proof but never cut out; the compositor must see exactly what to delete.

Insertions in text can be indicated by a line or a caret. If a replacement is to be made, the letters and symbols should be carefully circled or slashed; it is important that *all*, but *only*, the matter to be replaced is marked. The directions in the margin should be very clear and every mathematical term should be marked, e.g., as to whether it is italic, Greek, German, etc. No ambiguity should be allowed; for example, letters like S, s, C, and c should be marked for either upper or lower case. If more than one correction is made in a line, the directions in the margin from left to right should be in the same order as the markings in text, separated by a red or blue slash to indicate the end of each correction.

4.2.3 Querying authors

Questions for authors concerning words or symbols that are not clear or grammar that needs correction should be put into the margin of the first proof. When asking the author a question, never say, "Is it this or that?" Being a mathematician, the author is likely to answer "Yes". Ask "Should it be this way?" or "Is this correct?"

4.2.4 Excessive author corrections

If an author makes changes in first proof amounting to more than 10% of the original cost of composition, these changes are usually considered

excessive. Many publishers ask authors to bear the costs in excess of 10%. These excessive correction charges may be the result of large sections of text being deleted or of changes in wording or notation.

4.3 PROOFREADING

There are two standard methods of proofreading. One entails use of a copyholder (who reads the manuscript aloud) and a proofreader (who follows the typeset copy). The other method requires just one person who compares the manuscript and the printed material. Today the common practice among scientific organizations is that of using only one person.

4.3.1 Comparison proofreading

When proofreading is performed by one person, there are probably nearly as many methods as there are proofreaders. Some proofreaders roll the manuscript in their hands and compare words line by line with the proof. Others have the manuscript and proof side by side, following both copies with a finger or pencil; a ruler may be used to make line-following easier. Word-following is essential, because in mathematics there is often repetition of the same group of words and the eye is inclined to jump from one group to the next.

4.3.2 Proofreading using a copyholder

An excellent explanation of this method is given on pages 70–73 of *Words into Type* [**3**], including a list of copyholder's terms on page 72. For mathematical copy additional copyholder's terms are needed; Table 8 gives some of those used at the AMS.

TABLE 8

Symbol	Suggested Copyholder's Term	Symbol	Suggested Copyholder's Term
$\cup$	cup	$\vee$	check down
$\cap$	hat	$\wedge$	check up
$<$	less	$\langle\ \rangle$	elbow, end elbow
$>$	greater	$\sum$	sum
$\leq$	less equal	$\in$	member
$\geq$	greater equal	$\backslash$	back slash
$\sim$	wiggle	$\vert$	bar
[ ]	brack, end brack	$\bar{x}$	barred x
{ }	brace, end brace	$\Vert$	double bar
		$\ldots$	dots

4.3.3 Marking proof

The proofreader must mark all corrections in the margins of the first proof. Instructions are given in §4.2.1. For convenience and speed, marks are usually made in only one or two colors during the proofreading process. When transferring the corrections to a set of proof for the author, the production editor carefully notes the compositor's errors in red, author's errors in blue, and material to be typeset in black.

4.4 PAGE MAKEUP

For mathematics, page makeup is more complicated than for nonscientific material due to long displays that, ideally, should not be broken between pages. However, with the use of computer software, page makeup has been considerably simplified. Space between elements on the page (theorems, figures, tables, section heading, etc.) can be stretched and squeezed, sometimes imperceptibly, to help avoid bad page breaks and to eliminate an inordinate amount of repaging to get around undesirable breaks. Still it might be necessary at times to display textual material or to change the number of lines in a displayed equation in order to avoid bad breaks at the end of a page.

Good page makeup involves the following:

4.4.1 Length of pages

The length of each full page of text in the book or journal should match the specified page length for the project. However, it is allowable to deviate as much as a pica (in special cases even more) from the specified length. Facing pages should be exactly the same length but may differ by up to 1/2 pica in length from each other when necessary. With such small amounts of allowable variance, computer software is often able to even out the differences and to produce unnoticeably variant pages.

4.4.2 Chapter title page

The first page of a chapter is normally printed with sinkage, i.e., a drop in the text with extra white space at the top of the page as part of the book design. To allow for this sinkage, the text on the chapter title page should be at least two picas shorter than the text of a regular page. In some books this sinkage on a chapter title page is as much as 12 or 15 picas. Sinkage on all chapter title pages should be the same throughout a given publication.

4.4.3 Last page of a chapter or of a paper

There should be a *minimum* of eight lines on a page, preferably more.

4.4.4 Running heads

Type size and font are specified for each publication. The running head must be short enough to fit easily across the top of a page without over-

lapping the folio. The number of characters in a running head depends on the style and type size used.

4.4.5 Footnotes

Usually a minimum of 1/2 pica space is allowed between the last line of text and the footnotes at the bottom of the page. It is common to set the footnotes apart from the text by a horizontal rule about one inch long, placed at the left-hand margin.

A footnote must be on the same page as the reference to it. If it is absolutely impossible to put the entire footnote on the same page as its reference, the footnote may run over to the bottom of the following page. If this happens, the footnote should be broken in the middle of a sentence so that it is obvious to the reader that the footnote continues on the next page. The runover should be more than one line.

4.4.6 Breaking pages of mathematics

Try to avoid breaking pages at the following places:

(a) in the middle of a displayed equation that runs more than one line, especially if the break is not between facing pages,

(b) in a series of equations that are numbered as a group,

(c) after the first line of a new section,

(d) before the last line of a paragraph if it will leave a widow on the following page.

Pages *may* be broken between equations in a series in which each element is separated by a comma or other punctuation. (*Exception*: See (b) above.)

Pages should be broken *before* a short line that is not the end of a sentence and is followed by a display.

4.4.7 Lengthening and shortening pages

As mentioned earlier in this chapter, computer software can take care of paging easily and automatically, stretching and squeezing the leading between elements on the page. Still there are times when the production editor will have to intervene to make decisions that the computer cannot make ideally for the given situation.

Listed below are some suggestions. The last two require the experience and knowledge of the author or a technical editor.

(a) Add or subtract space from around displays.

(b) Add or subtract space from before sections if it is the style of the publication to insert space at such a point.

(c) Add or subtract space from before footnotes.

(d) Add or subtract space from around tables or graphics.

(e) Display an equation from the text.

(f) Change the number of lines in a display, being sure that it is broken at a suitable place as described in §3.3.4.

4.4.8 Returning first proof to the compositor

Indicate the order in which the papers being returned are to appear. Order the number of copies of final proof needed. It may include copies for the following:

1 for return to the compositor,

1 for the production editor,

1 for each editor,

2 for each author of a monograph. (Many journals do not send final proof to the author.)

4.5 FINAL PROOF

With careful copy editors, trained production editors, and a good compositor, final proof should be perfect or, at worst, should contain few errors. For this reason it is general practice that final proof be checked by only the production editor and not by authors for articles in journals or for proceedings that involve several authors. In the case of excessive corrections to author proof, it is advisable to ask the author to check a set of final proof. Authors of monographs often check the final proof.

The final proof stage is the last chance for detecting errors; therefore, all the following need to be carefully checked:

(a) corrections indicated on the first proof,

(b) reset lines,

(c) running heads, including folios,

(d) length of pages (see §4.4.1 for rules relating to the proper length of pages),

(e) cover and title pages. (Errors on these pages are more noticeable and seem to cause more grief in editorial offices than the mathematical errors. See §5.4 for a listing of the material that should appear on these pages. Proofread and check *with care*.)

4.6 GRAPHICS

The preparation of graphics is perhaps the area of publishing where the most dramatic and dynamic changes have taken place over the past decade. The technology available to produce sharp, crisp, complex graphics electronically abounds. The *AMS Author Handbook* [**5**] contains a helpful section on the preparation of graphics.

A graphic is a figure, graph, illustration, photograph, etc., supplied by the author in either nonelectronic or electronic format. Graphics may be in black and white or in color and may contain screens. A graphic usually has a brief caption set in small type underneath or to the side.

4.6.1 Nonelectronic graphics

Graphics prepared nonelectronically should be drawn in black ink with clean, unbroken lines on nonabsorbent paper and at the size they will appear in the published product. Whenever possible, fonts used in graphics should match those used in the text. The original graphics should be

supplied to the production editor. These hand drawn graphics can be scanned to produce electronic graphics that can be pulled into the text file electronically. Photographs and computer generated images supplied only on paper are also examples of nonelectronic graphics. When these are submitted, a labelled photocopy of each should also be supplied for identification.

4.6.2 Electronic graphics

While computer technology offers authors the ability to supply creative graphics electronically, it is also an area where publishing costs can increase steeply if graphics are not prepared properly. To help minimize costs, the author (or the person preparing graphics for the author) should follow the specific requirements of the publisher very carefully regarding format, resolution, etc.

In addition, authors should remember the following general guidelines when preparing electronic graphics:

(a) Graphics should be created at the size they will appear in the published product. Scaling figures (reducing and enlarging) should be avoided as much as possible.

However, when scaling *is* necessary, remember that the line weights in the figure will also scale. Therefore, the lightest line weight that should be used and that will reproduce clearly at high resolution is 0.5 points. Do NOT specify "hairline" weight since it will be almost invisible at high resolution and will disappear in the printing process. If a rule line is screened, its weight should be no lighter than 1 point. Graded line weights should increase in increments of at least 0.5 points. Increments less than this are insufficiently distinguishable at high resolution.

(b) Screened fills should be screened not less than 15% (less will print as white) and not greater than 85% (greater will print as black).

(c) If a graphic is not to appear in color in the published product, it should not be created in color.

4.6.3 Scaling

As mentioned above, figures should be created at the size they will appear in the published product. When they are not, scaling (reducing and enlarging) is necessary. Determining the size of printed figures is more a matter of judgment than of rule. Below are some guidelines for scaling.

(a) A figure should be scaled to a size that is aesthetically pleasing.

(b) If the figures contain symbols, the scaling factors should be chosen so that the size of the notation is uniform throughout the paper as much as possible.

(c) If there are several figures of the same size, they should have the same scaling factor as much as possible.

5

Processing a Publication in Mathematics

The steps involved in publishing mathematics, once a manuscript has been received by the production editor, are given in Tables 2 and 3 at the end of Chapter 1. Many of these steps, particularly those which have aspects that are rather unique for mathematical copy, have been covered elsewhere in this book. In this chapter there is a brief treatment of the steps that have not already been covered. Basically these are the same in mathematics as for other fields, but almost every step seems to have a special quirk that is different from producing, say, a novel and may even be different from other scientific publications.

The information in Chapter 5 is primarily for production staff, but authors will be interested to know how their work is processed for publication.

5.1 SELECTION OF A COMPOSITOR

Unless an electronic manuscript is being prepared by the author, one of the first decisions to be made is the selection of a compositor, because the whole editorial process is affected in some way by the type of composition that is chosen.

At the AMS, 83% of journal articles and 89% of the combined monograph chapters and proceedings volumes articles were submitted electronically in 1998, with typesetting already done by the author or his (or her) typist in LaTeX or TeX. As discussed earlier, this has brought increased efficiencies in time and money to our publications.

If you are having a mathematics book typeset by a composition house, choose a compositor who has experience in producing work of the complexity of your publication. It is standard practice to expect a new compositor to produce a printed sample. Ask to have it produced from manuscript (not printed copy) which you provide. It is much more difficult to set up a paper with properly spaced mathematical notation from a typed manuscript than from published copy. This warning may seem excessive, but it is based on actual experience that occasionally has been rather chastening when this advice was not followed.

Non-English-speaking compositors can often produce composition at an excellent price. Even if the errors are voluminous, the price may be good enough to make the final product cost less, even when the editorial charge is greater. However, it may not be worth the frustrations endured by the copy editors who must check corrections or the production editor who receives complaints from irate authors.

Another factor in choosing a compositor may be the speed at which proof and final copy will be provided. Get a commitment in this respect before the manuscript is sent—and hope that the schedule is met. Then encourage authors and editors to return proof in a timely manner.

Printing and composition may be performed by the same company, but often that is not the case. The choice of a printer is usually made according to the price and quality of the printer's work. The best method for choosing a printer is to put the job out for bids and to ask for samples of the paper stock to be used.

5.1.1 New compositor

When a new compositor has been chosen or when the relationship between the editorial office and the compositor has not been a continuing one, it is important that there be excellent communication between the production department and the compositor. Conventions that are used in editing must be fully understood by the typesetter or they are useless. Instead of working out instructions each time a new compositor is used, you may want to work out a form that is sent with the first batch of manuscripts for a book or a new journal. It should cover the points which have been found to cause difficulty or misunderstanding. If the compositor makes mistakes because these directions have not been followed, the errors are the compositor's errors, not editorial errors. See Appendix G.

5.1.2 Composition abroad

Some technical manuscripts are composed abroad because labor costs there are lower. The resulting publication is sometimes printed abroad as well. If the same company composes and prints a publication, the entire process is performed with fewer delays between stages. After publication abroad, however, there may be delays due to the financial necessity of mailing or shipping by sea and in getting copies through United States Customs Service.

Material composed abroad may be printed in the United States by having reproduction proof airmailed to a printer. If it can be put into his production schedule immediately, this works very well. There is, however, the possibility of a delay in getting into the printer's production schedule; this may be a week at best or several weeks at worst.

If the publication is being copyrighted, the law should be checked before composition or printing is done abroad.

5.2 RECEIPT OF MANUSCRIPTS

After a manuscript has been accepted for publication by an editor and forwarded to the publisher, it must be acknowledged and put into a production schedule. This can involve typing up identifying cards and/or listing it on a production schedule. Record keeping is necessary to prevent loss of manuscript, but the form varies from publisher to publisher. At the AMS record keeping and scheduling are done in a publications database.

5.2.1 Page charges

Some nonprofit organizations recover part of the cost of publication by levying page charges. In such cases part of the process of acknowledging journal manuscripts is that of approximating the number of printed pages in the article and sending an estimate of the page charge, which will be levied after publication, to the institution at which the author did the research. An estimate of the page charge is made before the copy is set into proof because some institutions prefer to receive prior warning of the charge. These charges are often paid under grants that may expire before the article is published; the estimate may be treated as a bill and the page charge paid immediately.

5.3 OFFPRINTS

Offprints are often provided for journal articles and for books which are made up of articles from several authors. Some publishers provide these offprints free, others upon payment of a charge. A common policy is to provide 50 free and charge for additional copies and/or for covers at or above the cost of producing them.

5.4 FRONT AND BACK MATTER

Few pages are involved with the front and back matter in contrast to the number of pages of mathematics, but one error on these pages seems to cause more trouble and disturbance than a dozen in the mathematics. The nature of the front and back matter precludes their being produced at the same time as the text. In concentrating on processing the proof of the text, the production editor sometimes forgets these pages until the last minute. Through hurry, errors are easily introduced or material forgotten.

Sources for information concerning the material to be included in these sections of a book or journal are given in [**3**, pp. 46–48]. The information included in the front and back matter of books differs from that in journals; therefore each is treated separately in the following sections, which list the items that should be considered for inclusion.

5.4.1 Journals

5.4.1a Covers

Front cover
- Name of journal
- Volume number
- Issue number
- International Standard Serial Number (ISSN)
- Month and year of publication

Inside front cover
- Copyright notice (see §5.5)
- Mailing and subscription information
- Name and address of publisher

Spine (may contain the following or part thereof)
- Name of journal
- Volume and/or issue number
- Month and year of publication
- Page span of issue

Other information which may be included on covers
- Additional information for subscribers
- Table of contents of the issue
- Information for contributors
- Copying and reprinting information
- Advertisements

5.4.1b Title page

Each volume contains a title page. It may be at the beginning of the first issue, or it may precede a volume index at the back of the last issue of the volume. It should contain
- Name of journal
- Volume and issue number
- Month and year of publication
- International Standard Serial Number (ISSN)
- Name and address of publisher

5.4.1c Contents

If included, the heading should give the volume and issue numbers (because the contents may be photocopied without the rest of the covers).

5.4.1d Indexes

A volume index is usually included at the back of the last issue in the volume. Cumulative indexes vary greatly as to format and frequency of occurrence.

5.4.2 Books

5.4.2a Covers

Whether paper or clothbound, these are usually designed more for appearance than for information. They may contain rather detailed information concerning the book, or merely a title.

5.4.2b Title page

Include the following:
- Title of book
- Title and volume of book series, if pertinent
- Author, if pertinent
- Editor (optional–may be on back of title page)
- Publisher's name and city
- Year of publication (optional)

5.4.2c Back of title page (copyright page)

Include the following:

Copyright notice (see §5.5 for additional information)

Editions and reprintings of the book

Library of Congress Catalog number (LC number) (optional) (see §5.6.1a)

International Standard Book Number (ISBN) (optional) (see §5.6.2)

Cataloging in Publication data (CIP) (optional) (see §5.6.1b)

Mathematics Subject Classifications (MSC) (optional) (see §5.6.3)

Acknowledgment of grants by government or private organizations that have financed the book or the research reported in it in full or in part

5.4.2d Other front matter

Any or all of the following may be included:

Half title page

Table of Contents

Dedication

List of abbreviations

List of illustrations

Preface

Foreword

Acknowledgments

5.4.2e Back matter

Books may include appendixes, bibliographies, and various indexes. Each of these items usually starts on a right-hand page. For further information consult §1.82–§1.91 of [**1**].

5.5 COPYRIGHT

The copyright notice, which includes the symbol ©, the year of publication, and the copyright holder's name, should be included in every volume and on each article which the author or publisher wishes to copyright.

Under the copyright law enacted in 1976 and which went into effect January 1, 1978, copyright protection begins from the moment of creation and automatically comes into being without notice or registration with the Copyright Office. However, placement of the copyright notice in the publication identifies the copyright owner, shows year of publication, and ensures the full protection of the law.

Either the author or the publisher may have copyright to a work. In the case of articles appearing in a journal, the routine practice for most publishers of scientific journals is for the author to transfer copyright to the publisher.

For publications copyrighted after January 1, 1978, the term is automatically for the author's life, plus an additional 50 years after the author's death. For works made for hire (as most journal articles are classified) the

term is 75 years from publication or 100 years from creation, whichever ends first.

To maintain copyright protection after the initial 28-year term, works copyrighted before 1964 still require renewal for the additional 47 years of protection.

Of the several forms available, publishers of mathematics will likely be using only the following forms:

FORM TX for application for a new copyright,

FORM SE for translation journals and books, also electronic-only journals,

FORM SE Short for journals,

FORM RE for renewals for articles published before 1978,

FORM IS in case of publications manufactured outside the United States for which an import statement is required.

For additional information on copyright contact the Copyright Office, Library of Congress, Washington, DC 20559.

5.6 CLASSIFICATION OF BOOKS AND JOURNALS

5.6.1 Cataloging information

5.6.1a Library of Congress Catalog Card Number (LC Number)

The LC Number is assigned by the Library of Congress upon application of the publisher. This number is usually inserted on the copyright page.

5.6.1b Library of Congress Cataloging in Publication Data (CIP)

Under the CIP Program, initiated in 1971 by the Library of Congress, the copyright page of the book contains not only the LC number, but also full cataloging information including items such as series title, cross references and, most important of all, catalog classification numbers. In order to receive this information prior to publication, the publisher provides information to the Library of Congress; they return the cataloging information within three to five weeks. The CIP data allows the librarian to catalog books immediately upon receipt, saving a great deal of time and money. For information on CIP data write to Library of Congress, Cataloging in Publication Division, Washington, DC 20540.

5.6.2 International Standard Book Number (ISBN)

A trade-wide convention for the numbering of books being published was adopted in Great Britain in 1967 and is now being used by publishers in many countries. Its main use is to provide a unique number for each book published, which can be used by modern electronic data processing equipment in the ordering and billing of books. (A separate ISBN is required for the hardcover, softcover, electronic, and any other version of the book.) Each publisher is assigned its own number to which additional digits are added to identify each book. Information on this system can

be obtained from the Standard Book Numbering Agency, R. R. Bowker Company, 1180 Avenue of the Americas, New York, New York 10036.

5.6.3 1991 Mathematics Subject Classification Scheme (MSC)

This is a three-level subject classification for mathematics, with sixty-one major sections and over 3000 subclassifications. It is used by *Mathematical Reviews* to classify articles which are reviewed in that journal and is published in the annual index issue of the journal, starting in December 1990. It is also available as a separate pamphlet [**24**]. This classification is a revision of the 1980 *Mathematics Subject Classification* (1985 *Revision*). The classifications are also available on the Web, at `http://www.ams.org/msc`.

A further revision, MSC2000, was presented at the 1998 International Congress of Mathematicians. *Mathematical Reviews* and *Zentralblatt für Mathematik* plan to use MSC2000 beginning in the year 2000.

5.6.4 International Standard Serial Number (ISSN)

The ISSN identifies a serial publication regardless of language or country in which it is published. Each series is assigned a unique and unchangeable number according to a standard scheme adopted internationally. (A separate ISSN is required for the print, electronic, and any other version of the product.) Each number is eight digits long, consisting of seven digits acting as a unique title number, plus a check digit.

Many publishers include these numbers on the front cover of periodicals and on the copyright page of book series. In the United States they may be obtained by writing to the Library of Congress, National Serials Data Program, Washington, DC 20540.

5.7 IDENTIFYING DIGITAL PUBLICATIONS

5.7.1 Publisher Item Identifier (PII)

The PII may appear at the top of the first page of each article in a journal. This alphanumeric string of characters uniquely identifies each article and can be used for future cataloging, searching, and electronic retrieval.

5.7.2 Digital Object Identifier (DOI) System

The DOI system provides unique identification and persistent linking ability for digital objects as defined by the publisher. The DOI is a two-part number; the first part is assigned by the DOI agency, and the second part is assigned by the publisher. The DOI system will direct inquirers worldwide to the publisher or rights holder of a particular digital item at any point in time. For further information contact the International DOI Foundation at 1718 Connecticut Avenue, NW, 7th Floor, Washington, DC 20009.

6

Publication Style

A publication in mathematics, like that in any other field, should be consistent from paper to paper or chapter to chapter in the manner of treating sections, theorems, footnotes, and dozens of other items. At the AMS, use of style files automatically provides the desired consistency. Style files for AMS books and journals are available as part of the author packages offered at `http://www.ams.org/tex/author-info.html`. Before composing a manuscript, check with your publisher to see if style files are available.

In this chapter there is a list of items that appear in books and journals with a suggestion as to the manner in which they might be treated by authors, typists, or design staff, should there be no style file available. (A sample paper displaying some of these specifications appears at the end of this chapter.) This list should not be construed as a complete set of specifications or as an attempt at standardization. It is intended to serve only as a guide, one which should be altered to suit a particular publisher.

6.1 TITLES AND AUTHORS

6.1.1 Titles

May be all 10/12 capital letters (caps), boldface, centered. Choose the font from those provided by the compositor. Sinkages and placement vary greatly from publication to publication.

6.1.2 Authors

May be 8/10 caps, lightface, centered. Choose font from those provided by compositor. Placement may vary according to specifications for a particular publication.

6.2 SECTIONS, CHAPTERS, AND PARTS

6.2.1 Sections

Paragraph. First paragraph in section may start flush left.

Type font and size of heading. Lightface, 10/12 cap and small caps, centered. Same type font as text.

Sections with no text in heading. Typeset number, centered, and same font as article text.

Leading. Ideally 24 points (pts) base-to-base (BB) before the section heading. Below, 21 pts BB.

Text. Lightface, 10/12.

Subsection heading. Flush left, 10/12 bold. Ideal space above, 18 pts, BB. Text run in.

Section sign (§). Use instead of the word section in text when referring to a numbered section. Omit before section number in heading.

6.2.2 Chapters and parts

6.2.2a Journals

Articles do not usually have chapters and parts. If used, follow these conventions for the heading:

Center, 11/13 bold, small caps with one initial full cap. Ideally 24 pts BB above, 21 pts BB below.

6.2.2b Books

Individual style to be set up by production editor or to be determined by the publisher's house style

6.3 ENUNCIATIONS

6.3.1 Theorems, corollaries, lemmas, and propositions

Flush left, roman bold heading, en-space to text in italic. Ideally 18 pts BB from element above and to element that follows.

6.3.2 Definitions, axioms, remarks, and examples

Flush left, roman bold heading, en-space to text in roman. Ideally 18 pts BB from element above and to element that follows.

6.3.3 Cases, problems, and other like items

Flush left, italic heading, unless the author has a specific suggestion. Text as marked by author. No extra leading.

6.3.4 Proofs

Flush left, italic heading. Text run in, roman. Ideally 18 pts BB from element above and to element that follows.

6.4 CAPITALIZATION IN TEXT

6.4.1 Enunciations and figures

When used as a common noun, spell out references to enunciations and figures with a lower case letter. If used as a proper noun and followed by an ordering symbol, capitalize.

Remark 1. Theorem A. Figure 3c.
Consider Theorem III in the...

6.4.2 Equations

Do not capitalize. An author is apt to refer to the same display as equation (3), property (3), or definition (3); it can become rather confusing if the word is treated as a proper noun when reference is made to it in so many ways.

6.5 BIBLIOGRAPHIC REFERENCES IN TEXT

Reference number in brackets. Number of reference in boldface type.

If reference includes chapter, pages, and other information, such information should follow the reference number.

EXAMPLES: [**1**], [**2**], [**5**] [**3**, pp. 5–8]

[**1**, Chapter 9, p. 81, Example 5]
or Example 5 in [**1**], Chapter 9, p. 81,

6.6 ORDERING SYMBOLS

Numerals, roman letters, roman numerals, or Greek letters may be used. Follow the manuscript. If the numbering is inconsistent or does not make sense, consult the author. (See §4.1.2b.)

6.6.1 Equation numerals in display

At margin, centered vertically, when possible. (See §3.3.1 and §3.3.2.)

6.6.2 Footnotes

Number consecutively throughout an article in a journal or chapter in a book.

Reference in text as an 8-point raised number.

Text in 8-point type. Paragraph. Use a raised 8-point number for identification.

6.7 GRAPHICS AND TABLES

6.7.1 Graphics (figures)

Caption. The word "Figure" is written out, printed in 8-point cap and small caps.

Placement. Graphics are placed preferably at the top or bottom of the page on which they are referred to in text, but definitely within the same section as the text reference.

Broadside. Graphics that are too wide to set into the regular page width may be set broadside. The bottom of the graphic should then be at the right-hand side of the page. If a graphic is set broadside, the caption is set broadside as well.

6.7.2 Tables

Caption. The word "Table" is written out above the table, printed in 8-point caps and small caps.

Type size. Same size and font as text. Use a smaller font if it will enable a large table to fit onto a page.

6.8 STYLE FOR BIBLIOGRAPHIES

In compiling or checking a bibliography, the main point to keep in mind is that all items should be clearly and unambiguously identified. This means that not only should the bare details be given, but enough information to survive a typographical error or two. If an article is identified as "R. Jones, Bull. AMS 1973, 393" and that page turns out to be a paper by B. Smith, what do you do? Is the typographical error the 393 or the 1973? Does AMS mean Australian Mathematical Society or American Mathematical Society? If the title had been given along with a volume number (as a check on the year) and a fuller journal name, at least the reader would have some hints or clues as to the identity of the article.

6.8.1 References to Mathematical Reviews

Reference may be made to *Mathematical Reviews* in bibliographies. MR **98f**:3207 at the end of a reference means that the article was reviewed as number 3207 in Issue 98f of Volume 98. Before Volume 20, *Mathematical Reviews* did not number individual reviews, so references to these volumes must be made by page number (MR **17**, 441a).

6.8.2 Journal articles

The information in a bibliographic reference is usually given in the order listed below. Starred items are included in *every* bibliography. The others are optional, depending on the publication. For optional items the number in parentheses is the number of the bibliographic item in §6.8.3 which illustrates it.

**Author.* Give at least one full name. Replace a repetition of the name of the author (or set of authors) in a bibliography by a short line.

* *Title of article.* In italic, one initial cap. *Exception*: All nouns in a German title are capitalized. Proper names are capitalized.

Preprints. List author, title, report number, institution, date and mention if "submitted for publication" or "to appear in".

* *Name of Journal.* In abbreviated form, using a standard like *Abbreviations of Names of Serials Reviewed in Mathematical Reviews* [**23**]. (The annual indexes of Mathematical Reviews give abbreviations as well as complete titles of thousands of mathematics journals and book series published worldwide.)

Series number. In parentheses, if applicable. (6)

Volume number. In boldface type. (1)

* *Year of publication.* In parentheses.

Page numbers. Give span of pages covered. (1)

Language. List language in which the article is written (in parentheses) if the title is in a different language from the article. This is used principally for reference to Russian articles when the title is given in English. (7)

Translation (into English). Give full reference.

(a) If from a cover-to-cover translation of a journal, precede by "=". (8)

(b) If not, precede by "English transl." (6)

Forthcoming article. Give all available information and follow by "to appear" or "submitted to". Ask author in proof if the article has appeared. (9)

MR number. (1)

6.8.3 Examples of references to journal articles

1. L. J. Weill, *Stability of bases in complete barrelled spaces*, Proc. Amer. Math. Soc. **18** (1967), 1045–1050. MR **36**:642
2. Eberhard Lanckau, *Eine einheitliche Darstellung der Lösungen der Tricomischen Gleichung*, Z. Angew. Math. Mech. **42** (1962), 180–186. MR **25**:336
3. ———, *Die Differential- und Integralgleichungen*, Bayer. Akad. Wiss. Math.-Nat. Kl. S.-B. **1958**, 111–115.
4. A. Lelek and D. Zaremba, *Dimensions of irreducible continua and fixations of components in compact spaces*, Fund. Math. **51** (1962/63), 81–86. MR **26**:1861
5. G. G. Esseen, *Fourier analysis of distribution functions: A mathematical study of the Laplace-Gaussian law*, Acta Math. **77** (1945), 1–125. MR **7**:312a
6. L. M. Abramov and V. A. Rohlin, *Entropy.* II: *The entropy of a skew product of measure-preserving transformations*, Vestnik Leningrad. Univ. **17** (1962), no. 7, 5–13; English transl., Amer. Math. Soc. Transl. (2) **48** (1965), 255–265. MR **25**:4076
7. G. N. Agaev and R. I. Alianova, *A Cauchy problem for a functional equation*, Akad. Nauk Azerbaĭdžan. SSR Trudy Inst. Mat. Meh. **2** (**10**) (1963), 129–132. (Russian) MR **27**:1037

8. A. I. Kostrikin and I. R. Šafarevič, *Cartan pseudogroups and Lie p-algebras*, Dokl. Akad. Nauk SSSR **168** (1965), 740–742 = Soviet Math. Dokl. **6** (1965), 715–718. MR **33**:7384
9. T. Ja. Gohberg, *Congruence in sets*, Ann. of Math. (to appear).

6.8.4 Books

Information is usually put into references in the order listed below. The starred items are contained in every reference, if available; the other information is given when pertinent and available. For optional items the number in parentheses is the number of the bibliographic item in §6.8.5 which illustrates it.

**Author or editor.* When pertinent, insert (ed.) after the name.

**Title of a monograph.* In italics.

**Title of a paper in a collected work.* In italic.

Title of a chapter in a monograph or proceedings of a symposium. In italics. (13) (14)

**Series name.*

Volume number. (13)

Proceedings of a symposium. Title in initial caps, with time and place in parentheses. (14)

Editions. (11)

**Publisher.* Abbreviated form. Include name of city and state or foreign city where published.

**Year of publication.*

Pages. Included only if a chapter or paper within a book is cited. (14) (15)

MR number. (10) (13) (14)

6.8.5 Examples of references to books

10. G. H. Hardy, J. E. Littlewood, and G. Pólya, *Inequalities*, 2nd ed., Cambridge Univ. Press, New York, 1952. MR **13**:727e
11. E. S. Pierce, *Algebra*, 2nd ed., Appleby Press, Rehoboth, MA, 1959.
12. A. Gelbart (ed.), *Recent advances in computers*, Noordhoff, Groningen, 1958.
13. N. Dunford and J. T. Schwartz, *Linear operators*. I: *General theory*, Pure and Appl. Math., vol. 7, Interscience, New York and London, 1958. MR **22**:8302
14. J. R. Stallings, *On fibering certain 3-manifolds*, Topology of 3-Manifolds and Related Topics (Proc. Univ. of Georgia Inst., 1961), Prentice-Hall, Englewood Cliffs, NJ, 1962, pp. 95–100. MR **28**:1600
15. N. Bernstein, *Continuous functions of polynomials*, Collected works. Vol. 1: The constructive theory of functions, Smith, Boston, MA, 1970, pp. 189–222.

6.8.6 Electronic material

A standard format for referencing electronic material is still being developed. As with references to paper publications, it is important that

enough information be given to enable the reader to find the particular item. Starred items are included in every bibliography.

**Author*.
**Title*. In italics.
**Publication*.
**Date posted*.
Digital ID. See, for example, DOI System in §5.7.2.
Add the word "electronic" in parentheses after the bibliographic data.
MR number.

6.8.7 Example of reference to electronic material

16. H. Izeki, *The Teichmuller distance on the space of flat conformal structures*, Conform. Geom. Dyn. **2** (1998), 1–24, posted on February 3, 1998, PII: S1088-4173(98)00009-5 (electronic). MR 98k:58034

6.8.8 Additional sample references

The sample references below give AMS style for a wide variety of reference types.

Sample Description	Reference Numbers
Itogi Nauki	1
Bracketed form of author's name	2, 31
Editor	3, 20, 25, 27
Paper in book	2, 4, 5, 7, 10, 18, 19, 20, 23, 25, 26, 27
Book	3, 6, 9, 22, 29, 30, 35, 38
Paper in a journal	8, 11, 12, 16, 17, 21, 39
Book in series	1, 3, 5, 7, 9, 10, 18, 19, 22, 23, 25, 26, 27
Paper with English translation	1, 11, 21, 34
Foreign title	12, 19, 31
Preprint	13, 35, 36
Deposited manuscript	14, 36
Four or more authors	1, 16
Language reference	2, 4, 6, 14, 17
Proceedings of conferences	5, 18, 19, 20, 25, 40
Journal where the year is vol. no.	21
Book with English translation	22, 29, 30
Paper in a book with two parts	23
Paper with two parts	32, 33
Submittted or accepted	15, 24
Use of Vol. and vol.	25
Meeting information	26, 27
Thesis	28
Edition and/or revised edition	29
Title of translation differs from the title of original	29
Co-publication	30
Reprint in the author's works	31
URL address	36, 37
Review in Mathematical Reviews	39, 40

Sample References

1. K. I. Beĭdar et al., *Associative rings*, Itogi Nauki i Tekhniki: Algebra, Topologiya, Geometriya, vol. 22, VINITI, Moscow, 1984, pp. 3–115; English transl. in J. Soviet Math. **38** (1987), no.3. MR **86h**:16001
2. I. D. Bunu and E. I. Tebyrce [Tèbyrtse], *The distributivity of a lattice of pretorsions*, Abelian Groups and Modules, Tomsk. Gos. Univ., Tomsk, 1984, pp. 3–10. (Russian) MR **88h**:16037
3. A. P. Huhn and E. T. Schmidt (eds.), *Contributions to lattice theory*, Colloq. Math. Soc. János Bolyai, vol. 33, North-Holland, Amsterdam and New York, 1983. MR **84j**:06001
4. V. I. Igoshin, *Interval projections of lattices*, Algebraic Actions and Orderings, Leningrad. Gos. Ped. Inst., Leningrad, 1983, pp. 42–49. (Russian) MR **85h**:06014
5. Toma Albu, *Certain Artinian lattices are Noetherian. Applications to the relative Hopkins-Levitzki theorem*, Methods in Ring Theory (Antwerp, 1983), NATO Adv. Sci. Inst. Ser. C: Math. Phys. Sci., vol. 129, Reidel, Dordrecht and Boston, 1984, pp. 37–52. MR **86m**:06014
6. V. M. Kopytov, *Lattice-ordered groups*, "Nauka", Moscow, 1984. (Russian) MR **87b**:06030
7. C. Holmes, *Split extensions of Abelian groups with identical subgroup structures*, Contributions to Group Theory, Contemp. Math., vol. 33, Amer. Math. Soc., Providence, RI, 1984, pp. 265–273. MR **86h**:20089
8. M. Bell, *Two Boolean algebras with extreme cellular and compactness properties*, Canad. J. Math. **35** (1983), 824–838. MR **85h**:06032
9. A. J. Casson and S. A. Bleiler, *Automorphisms of surfaces after Nielsen and Thurston*, London Math. Soc. Stud. Texts, vol. 9, Cambridge Univ. Press, Cambridge and New York, 1988. MR **89k**:57025
10. H. J. Bandelt, *Free objects in the variety generated by rings and distributive lattices*, Lecture Notes in Math., vol. 998, Springer-Verlag, New York and Berlin, 1983, pp. 255–260. MR **85m**:06013
11. G. M. Brodskiĭ, *Dualism in modules and the $AB5*$ condition*, Uspekhi Mat. Nauk **38** (1983), no. 2, pp. 201–202; English transl. in Russian Math. Surveys **38** (1983). MR **84e**:16013
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14. ———, *Lattice closedness of all commutative semigroups*, Manuscript No. 602, deposited at VIOSO by the editors of Nostr. Mat., 1984. (Russian)
15. I. Boiler, *Freedom of orientable manifolds*, J. Sup. Math. (to appear).
16. G. Burosch et al., *On subalgebras of an algebra of predicates*, Elektron. Informationsverarb. Kybernet. **21** (1985), no. 1–2, 9–22. MR **87c**:03044
17. K. I. Beĭdar and K. Salavova, *The lattices of N radicals, left strong radicals, and left hereditary radicals*, Acta Math. Hungar. **42** (1983), no. 1–2, 81–95. (Russian) MR **85i**:16009
18. I. Chajda, *Transferable tolerances and weakly tolerance regular lattices*, Lectures in Universal Algebra (Szeged, 1983), Colloq. Math. Soc. János Bolyai, vol. 43, North-Holland, Amsterdam and New York, 1986, pp. 27–40. MR **87k**:08003
19. K. Denecke, *Präprimale Algebren, die arithmetische Varietäten erzeugen*, Universal Algebra and Applications (Warsaw, 1978), Banach Center Publ., vol. 9, PWN, Warsaw, 1982, pp. 391–398. MR **85j**:08006a
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23. I. M. Gel′fand and V. A. Ponomarev, *Lattices, representations, and algebras connected with them.* I, II, Representation Theory, London Math. Soc. Lecture Note Ser., vol. 69, Cambridge Univ. Press, Cambridge, 1982, pp. 229–247, 249–272. MR **58**:16779a,b; **84a**:20003
24. E. A. Robinson, *The maximal abelian subextension determines weak mixing for group extensions*, Proc. Amer. Math. Soc. (submitted).
25. J. Rauch and Michael C. Reed, *Bounded, stratified, and striated solutions of hyperbolic systems*, Nonlinear Partial Differential Equations and Their Applications. Collège de France Seminar. Vol. IX (H. Brézis and J. L. Lions, eds.), Pitman Res. Notes Math. Ser., vol. 181, Longman Sci. Tech., Harlow, 1989, pp. 334–351. MR **90f**:35122
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33. Z. Zho-fan, *Monomials.* I, Tot. Math. **19** (1972), 335–350; II, Tot. Math. **20** (1973), 19–37.
34. V. I. Trofimov, *Graphs with polynomial growth*, Mat. Sb. **123** (1984), 407–421; English transl., Math. USSR-Sb. **51** (1985), 388–403. MR **85m**:05041
35. S. N. Bhatt, *Parallel algorithms*, book, preprint.
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37. D. Gray and P. Stowman, *Macaulay* 2, Version 0.8, January 7, 1997, available at `http://www.math.uabc.edu/Macaulay2`.
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39. Bruno Poizat, *Missionary mathematics*, J. Symbolic Logic **53** (1988), 137–145. MR **89b:**03058
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6.9 SAMPLE ARTICLE

A sample article that illustrates selected typesetting specifications from this chapter follows on the next page.

TRANSACTIONS OF THE
AMERICAN MATHEMATICAL SOCIETY
Volume 351, Number 12, Page 6229
S 0002-9947(99)08832-5
Article electronically published on April 1, 1999

AMS JOURNAL SAMPLE

AUTHOR

This paper is dedicated to our authors.

ABSTRACT. This paper is a sample prepared to illustrate some of the typesetting specifications for the Transactions of the American Mathematical Society.

THIS IS AN UNNUMBERED FIRST-LEVEL SECTION HEAD

This is an example of an unnumbered first-level heading.

1. THIS IS A NUMBERED FIRST-LEVEL SECTION HEAD

This is an example of a numbered first-level heading.

This is an unnumbered second-level section head.

This is an example of an unnumbered second-level heading.

Lemma 1.1. *Let $f, g \in A(X)$ and let E, F be cozero sets in X. If f is E-regular and $F \subseteq E$, then f is F-regular.*

The following is an example of a proof.

Proof. Set $j(\nu) = \max(I \backslash a(\nu)) - 1$. Then we have

$$\sum_{i \notin a(\nu)} t_i \sim t_{j(\nu)+1} = \prod_{j=0}^{j(\nu)} (t_{j+1}/t_j).$$

and the result follows. □

This is some text following the proof of the lemma.

Definition 1.2. This is an example of a 'definition' element. For $f \in A(X)$, we define $\mathcal{Z}(f) = \{E \in Z[X] : f \text{ is } E^c\text{-regular}\}$.

This is some text following the definition.

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DEPARTMENT OF MATHEMATICS, LOUISIANA STATE UNIVERSITY, BATON ROUGE, LOUISIANA 70803
E-mail address: xyz@math.university.edu

1991 *Mathematics Subject Classification.* Primary 54C40, 14E20; Secondary 46E25, 20C20.
Key words and phrases. Differential geometry, algebraic geometry.

7

Trends

The by-word today is *access*, and its corollary is *speed*. With unrelenting changes in technology upon us, there is hardly time to become nostalgic over those comfortable routines of following a house style to a T and having *perfectly* grammatically correct articles. The pressure is on to publish as quickly as possible and to make published material accessible *electronically*, with as much "value added" as possible. That means searchablility, abundant linking (forward and backwards, not to mention intra- and inter-systems), and in numerous formats (HTML, PDF, PS, DVI, TEX, to name some)—all with the *best* quality at the *lowest* prices. It's a challenge, especially since we set the ground rules as we go along and develop systems as we use them (and change them). But we've come a long way in a very short time.

7.1 JOURNALS

From the relatively short history that we have of publishing journals electronically, the trend has been a move away from just traditional paper printing to a dual publication of paper with the electronic format available as close to the printing date as possible...and it didn't take long for that to transition into the electronic format being available as early as possible *before* the print product. The current trend is towards the electronic version appearing first with the print product following. Some believe that in time the electronic publication will largely replace paper, with print products still available, but with smaller run sizes to fit the demand and prices reflecting the run size. At the same time a number of publications have started up as electronic-only publications.

7.2 BOOKS

Book publishing is also being transformed by the multitude of possibilities offered by technological development. Books that serve primarily to dispense information—encyclopedias, for example—are long since available on CD-ROM at a fraction of the cost of a printed encyclopedia. Book series whose volumes are made up of papers from conferences, symposia, and the like, are beginning to be published in the dual format first adopted in journal publishing, and may eventually go the route of electronic-only publication. Other books, such as monographs, whose material needs to be read through and grappled with, are more likely to remain print publications.

Also to be taken into account are the convenience and cultural factors that support printed books. A book can be taken almost anywhere, and it can be shown—or shown off—in a way that an electronic publication cannot be. Tenure committees generally prefer print publications, and bookcases are still part of the office and home furnishings.

As this edition of *Mathematics into Type* goes to press, there are electronic books (e-books) on or soon to be on the market. These hand-held devices are highly portable, can store thousands of pages of text at once, and have built-in conveniences such as browsing, searching, highlighting, and bookmarking. A dictionary and other reference materials may be included, font sizes may be adjusted, and the screen may be read in all lighting conditions. Still, these e-books feel more like minicomputers than books. The future will tell how successful they will be as they are improved and their prices come down.

7.3 PRINT-ON-DEMAND

Print-on-demand is being used more and more frequently as publishers discover they can feed production files, that often have started on the author's computer, directly over a network into a digital printer, which produces copy by copy the desired reprint, book, or other publication. After the required number of copies have been printed, the file can be archived for the time when more copies are needed. The publisher can thereby save warehousing costs and cut losses when a short print run is all that is ever needed.

A digital printer can also be used for variable data printing (VDP), which facilitates personalization of letters, memos, and promotional materials, to name just a few possibilities.

7.4 BUT LET'S BE NOSTALGIC ANYWAY!

Why not take a few minutes from the mad rush and see how the future is already here! When Ellen Swanson revised *Mathematics into Type* in 1979, she quoted some material by Donald E. Knuth about what she felt captured future trends. She was right on target.

Ellen wrote,

"I shall conclude thoughts of the future by quoting from an article which was published in the March 1979 issue of the *Bulletin (New Series) of the American Mathematical Society*. The author, Donald E. Knuth, has developed a typesetting system which is intended for books which contain a lot of mathematics; it is currently in use at Stanford University. The computer manual for this system (called TEX) is being published by the American Mathematical Society in 1979."

From Donald's Knuth's article:

"Within another ten years, I expect that most office typewriters will be replaced by television screens attached to a keyboard and to a small computer. It will be easy to make changes to a manuscript, to replace all occurrences of one phrase by another and so on, and to transmit the manuscript either to the television screen, or to a printing device, or to

another computer. Such systems are already in use by most newspapers, and new experimental systems for business offices actually will display the text in a variety of fonts. It won't be long before these machines change the traditional methods of manuscript preparation in universities and technical laboratories.

"Once such systems become widespread, authors will be able to prepare their papers and see exactly how they will look when printed. Everyone who writes mathematical papers knows that his intentions are often misunderstood by the printer, and corrections to the galley proof have a nontrivial probability of introducing further errors. Thus, in the words of three early users of the Bell Lab's system, 'the moral seems clear. If you let others do your typesetting, then there will be errors beyond your control; if you do your own, then you have only yourself to blame.' Personally, I can't adequately describe how wonderful it feels when I now make a change to the manuscript of my book, as it is stored in the Stanford computer, since I know that the change is immediately in effect; it never will go through any middlemen who might misunderstand my intention.

"Perhaps some day a typesetting language will become standardized to the point where papers can be submitted to the [publisher] from computer to computer via telephone lines. Galley proofs will not be necessary, but referees and/or copy editors could send suggested changes to the author, and he could insert these into the manuscript, again via telephone."

8

Appendixes

8.1 APPENDIX A: ALTERNATIVE NOTATION

Examples 1 and 2 can be typeset easily using modern composition methods, but notation over letters might tend to set too far to the left or to the right and, therefore, might not look good.

Examples 3, 4, and 6 can be set easily if the space between lines of text is allowed to stretch. In displays they cause no problem.

Example 5 is an instance of the general rule: Write e^u if u is simple, and write $\exp(u)$ if u is complicated.

Examples 7, 8, 10, and 12 can be readily set in displays. In text the notation takes more than one line and makes spreading of lines necessary.

Example 11 is unwieldy.

	Notation	Alternatives
1.	$\dot{A}$, $\bar{b}$, $\tilde{\gamma}$, $\hat{g}$, $\mathring{\Lambda}$	A', b'', γ^*, g_*, $\Lambda^{\#}$
2.	$\vec{v}$	$\mathbf{v}$ (boldface)
3.	$\overline{\lim}$, $\underline{\lim}$	lim sup, lim inf
4.	$\varinjlim$, $\varprojlim$	inj lim, proj lim
5.	$e^{\frac{x^2+y^2}{a^2}}$	$\exp((x^2+y^2)/a^2)$
6.	$\sqrt{a^2+b^2}$	$(a^2+b^2)^{1/2}$
7.	$\frac{7}{8}$, $\frac{a+b}{c}$	$\frac{7}{8}$ or $7/8$, $(a+b)/c$
8.	$\sum_{i=0}^{n}$, $\prod_{i=1}^{\infty}$	$\sum_{i=0}^{n}$, $\prod_{i=1}^{\infty}$
9.	$\overline{A \cap B}$	$\mathrm{Cl}(A \cap B)$ (Cl = closure)
10.	$A \xrightarrow{f} B$	$f\colon A \to B$
11.	$\dfrac{\cos\dfrac{1}{x}}{\sqrt{a+\dfrac{b}{x}}}$	$\dfrac{\cos(1/x)}{(a+b/x)^{1/2}}$
12.	$\binom{a}{b}$	$C_{a,b}$
13.	$e_{i_1 i_2 \cdots i_n}$	$e(i_1, i_2, \ldots, i_n)$
14.	$d_{\tilde{a}}$, $d_{\bar{c}}$	$d_{a'}$, $d_{c''}$

8.2 APPENDIX B: A MANUSCRIPT AFTER COPYEDITING

8.2.1 Manuscript marked by copy editor

MATHEMATICAL COPYEDITING

Ralph A. Marker

1. Introduction. This is a manuscript written to illustrate some of the rules given in Chapter 2.

Corollary 1. All typed letters and symbols are part of the original manuscript. All handwritten lines and markings are copyediting marks, which would be in red or blue pencil on the actual manuscript.

2. To display or not to display. What happens when several short displays are typed onto several lines? One way of treating them is to run them onto one line, saving printing space.

$$\varepsilon x = a^{k_n} - b^{2^n}, \qquad \varepsilon y = a^{k_{n+1}} - b^{2^{n+1}}.$$

Note that the epsilon is underlined in red to show it is Greek and to distinguish it from the member sign, $\in$.

Some papers have long complicated expressions in the text which happen to break at an equal sign in the manuscript. In print it may be necessary to display such an expression in order to avoid a bad break: $f(t,y(t)) - f(t,x(t)) = \int_0^1 f_x(t,x(t))^2(f_y(t,y(t))\,dt.$

3. Stacked fractions and complicated superscripts. A stacked fraction like $a = \frac{bx}{n}$ is preferably changed to a one-line form if it is in text. Note how the following expressions are treated in the manuscript in order to simplify the printed version.

$$\frac{\sin\left(\frac{1}{y}\right)}{\sqrt{\left(A - \frac{x}{y}\right)^{1/2}}}; \quad \exp\left(m^2\left(\frac{2m}{m-1}\right)^N\right); \quad \left(\frac{1}{n}\right)(a - b - c) = A.$$

8.2.2 Preceding manuscript after typesetting

MATHEMATICAL COPYEDITING

RALPH A. MARKER

1. Introduction. This is a manuscript written to illustrate some of the rules given in Chapter 2.

COROLLARY 1. *All typed letters and symbols are part of the original manuscript. All handwritten lines and markings are copyediting marks, which would be in red or blue pencil on an actual manuscript.*

2. To display or not to display. What happens when several short displays are typed onto several lines? One way of treating them is to run them onto one line, saving printing space.

$$\epsilon x = a^{k_n} - b^{2^n}, \qquad \epsilon y = a^{k_m+1} - b^{2^m+1}.$$

Note that the epsilon is underlined in red to show it is Greek and to distinguish it from the member sign, $\in$.

Some papers have long complicated expressions in the text which happen to break at an equal sign in the manuscript. In print it may be necessary to display such an expression in order to avoid a bad break:

$$f(t, y(t)) - f(t, x(t)) = \int_0^1 f_x(t, x(t))^2 (f_y(t, y(t)))\, dt.$$

3. Stacked fractions and complicated superscripts. A stacked fraction like $a = bx/n$ is preferably changed to a one-line form if it is in text. Note how the following expressions are treated in the manuscript in order to simplify the printed version.

$$\frac{\sin(1/y)}{(A - x/y)^{1/2}}; \qquad \exp\left(m^2 \left(\frac{2m}{m-1}\right)^N\right); \qquad (1/n)(a - b - c) = A.$$

8.3 APPENDIX C: LIST OF MATHEMATICAL SYMBOLS

The table below lists many of the commonly used mathematical symbols, available from most compositors. This list is extensive, but not exhaustive.

1	$+$	37	$\ll$	73	$\vee$	109	$\square$	145	$\leftarrow$
2	$-$	38	$\gg$	74	$\wedge$	110	$\diamond$	146	$\leftrightarrow$
3	$\pm$	39	$\lll$	75	$\bigvee$	111	$\surd$	147	$\rightleftarrows$
4	$\mp$	40	$\ggg$	76	$\bigwedge$	112	∞	148	$\leftrightarrows$
5	$\times$	41	$/$	77	$\sum$	113	$\propto$	149	$\nrightarrow$
6	$\bigtimes$	42	$\backslash$	78	$\prod$	114	$\exists$	150	$\mapsto$
7	$=$	43	$\sim$	79	$\int$	115	$\forall$	151	$\rightsquigarrow$
8	$\neq$	44	$\backsim$	80	$\oint$	116	∂	152	$\twoheadrightarrow$
9	$\not\equiv$	45	$\simeq$	81	$\cdot$	117	$\supset$	153	$\rightrightarrows$
10	$:=$	46	$\eqsim$	82	$\circ$	118	$\wp$	154	$\leftleftarrows$
11	$=:$	47	$\cong$	83	$\varnothing$	119	$\aleph$	155	$\hookrightarrow$
12	$\div$	48	$\approx$	84	$\odot$	120	$\#$	156	$\hookleftarrow$
13	$\doteq$	49	$\cong$	85	$\oplus$	121	$\sharp$	157	$\rightharpoonup$
14	$\div$	50	$\nsim$	86	$\otimes$	122	$\flat$	158	$\leftharpoonup$
15	$<$	51	$\ncong$	87	$\ominus$	123	$\natural$	159	$\rightleftharpoons$
16	$>$	52	$\napprox$	88	$\bigoplus$	124	$'$	160	$\uparrow$
17	$\leqslant$	53	$\not=$	89	$\bigotimes$	125	$^\circ$	161	$\downarrow$
18	$\geqslant$	54	$\subset$	90	$\angle$	126	$_*$	162	$\updownarrow$
19	$\not<$	55	$\supset$	91	$\perp$	127	*	163	$\upharpoonleft$
20	$\not>$	56	$\subseteq$	92	$\top$	128	$*$	164	$\upharpoonright$
21	$\leqslant$	57	$\supseteq$	93	$\lrcorner$	129	$\star$	165	$\nearrow$
22	$\geqslant$	58	$\not\subset$	94	$\llcorner$	130	$:$	166	$\nwarrow$
23	$\lesseqgtr$	59	$\not\supset$	95	$\barwedge$	131	$!$	167	$\searrow$
24	$\gtreqless$	60	$\not\subseteq$	96	$\neg$	132	$\vert$	168	$\swarrow$
25	$\not\lessgtr$	61	$\not\supseteq$	97	$\vdash$	133	$\nmid$	169	$\Rightarrow$
26	$\not\gtrless$	62	$\subsetneq$	98	$\models$	134	$\parallel$	170	$\Leftarrow$
27	$\lesssim$	63	$\supsetneq$	99	$\nvdash$	135	$\vert\vert\vert$	171	$\Leftrightarrow$
28	$\gtrsim$	64	$\in$	100	$\nvDash$	136	$\boxplus$	172	$\Uparrow$
29	$\prec$	65	$\notin$	101	$\&$	137	$[$	173	$\Downarrow$
30	$\succ$	66	$\ni$	102	$\triangle$	138	$]$	174	$\Updownarrow$
31	$\not\prec$	67	$\not\ni$	103	$\triangledown$	139	$\{$	175	$\curvearrowright$
32	$\not\succ$	68	$\cap$	104	Δ	140	$\}$	176	$\curvearrowleft$
33	$\preccurlyeq$	69	$\cup$	105	∇	141	$\langle$	177	$\triangleleft$
34	$\succcurlyeq$	70	$\bigcap$	106	$\blacktriangle$	142	$\rangle$	178	$\triangleright$
35	$\therefore$	71	$\bigcup$	107	$\blacktriangledown$	143	$\rightarrow$		
36	$\because$	72	$\asymp$	108	$\blacksquare$	144	$\longrightarrow$		

8.4 APPENDIX D: SIGNS USED IN CORRECTING PROOF

The following signs are used in correcting proof.


Delete; take out


Close up


Insert


Insert space


Raise


Lower


Move to left


Move to right


Straighten type line at side of page


Straighten lines


Paragraph


Put in middle of page or line


Transpose


Transpose


Turn inverted letter right side up

Change broken letter


Let it stand as set

Let it stand as set


Wrong font, size, or style


Lower case, not capitals


Use roman letter


Use bold letters


Period


Comma


Apostrophe


Superscript


Subscript


Hyphen


Use small capitals


Use capitals


Use italics

8.5 APPENDIX E: USE OF PROOFREADING SIGNS

8.5.1 Proof with corrections marked by proofreader

of B_1 and $d_1 d'_p$ divides $d_1 d'_p + 1$. Hence B is reducible to the form (11.5) with diagonal terms d_1, $d_1 d'_2, \ldots, d_1 d'_p$ which proves (11.4).

12. Groups with a finite number of generators. We shall discuss certain properties of these groups culminating in the basic product decomposition (12.5).

(12.1) DEFINITION. *Let $B = \{g_1, \ldots, g_n\}$, $B' = \{g'_1, \ldots, g'_n\}$ be two sets of elements of G containing the same number n of elements. By a unimodular transformation $\tau\colon B \to B'$ is meant a system of relations*

(12.2) $$g'_i = \sum a_{ij} g_j, \qquad \|a_{ij}\| \text{ unimodular.}$$

The following proposition shows in how natural a manner unimodular transformations make their appearance in the theory of groups with finite bases.

(12.3) *Let G be a group with a finite base $B = \{g_1, \ldots, g_n\}$. In order that $B' = \{g'_1, \ldots, g'_n\}$ be a base for G, it is necessary and sufficient that B' be obtainable from B by a unimodular transformation.*

For any given set $B' = \{g'_1, \ldots, g'_n\}$ of elements of G there exist relations

(12.4) $$g'_i = \sum c_{ij} g_j, \qquad C = \|c_{ij}\|$$

A necessary and sufficient condition ~~in order~~ that $\{g'_i\}$ be a base is that the g_j be expressible as linear combinations of the g'_i, or that there exist relations

(12.5) $$g_i = \sum d_{ij} g'_j, \qquad D = \|d_{ij}\|.$$

From this follows

$$g_i = \sum d_{ij} c_{jk} g_k$$

Hence since B is a base, we must have $DC = 1$.

This matrix relation yields $|D| \cdot |C| = 1$, and since the determinants are integers, we must have $|C| = \pm 1$. Thus in order that B' be a base, C must be unimodular, or the condition of (12.3) must be fulfilled. Conversely, if it is fulfilled, C is unimodular and (12.5) holds with $D = C^{-1}$, from which it follows readily that b' is a base.

8.5.2 Preceding passage printed with corrections made

of B_1 and $d_1 d'_p$ divides $d_1 d'_{p+1}$. Hence B is reducible to the form (11.5) with diagonal terms $d_1, d_1 d'_2, \ldots, d_1 d'_p$ which proves (11.4).

12. Groups with a finite number of generators. We shall discuss certain properties of these groups culminating in the basic product decomposition (12.5).

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$$g'_i = \sum a_{ij} g_j, \qquad \|a_{ij}\| \text{ unimodular.} \tag{12.2}$$

The following proposition shows in how natural a manner unimodular transformations make their appearance in the theory of groups with finite bases.

(12.3) *Let G be a group with a finite base $B = \{g_1, \ldots, g_n\}$. In order that $B' = \{g'_1, \ldots, g'_n\}$ be a base for G, it is necessary and sufficient that B' be obtainable from B by a unimodular transformation.*

For any given set $B' = \{g'_1, \ldots, g'_n\}$ of elements of G there exist relations

$$g'_i = \sum c_{ij} g_j, \qquad C = \|c_{ij}\|. \tag{12.4}$$

A necessary and sufficient condition that $B' = \{g'_i\}$ be a base is that the g_j be expressible as linear combinations of the g'_i, or that there exist relations

$$g_i = \sum d_{ij} g'_i, \qquad D = \|d_{ij}\|. \tag{12.5}$$

From this follows

$$g_i = \sum d_{ij} c_{jk} g_k.$$

Hence since B is a base, we must have $DC = 1$. This matrix relation yields $|D| \cdot |C| = 1$, and since the determinants are integers, we must have $|C| = \pm 1$. Thus in order that B' be a base, C must be unimodular, or the condition of (12.3) must be fulfilled. Conversely, if (12.3) is fulfilled, C is unimodular and (12.5) holds with $D = C^{-1}$, from which it follows readily that B' is a base.

8.6 APPENDIX F: GERMAN AND SCRIPT ALPHABETS

	GERMAN (handwritten)		GERMAN (typeset)		SCRIPT (two forms)*	
A	$\mathcal{A}$	$\mathcal{a}$	$\mathfrak{A}$	$\mathfrak{a}$	$\mathcal{A}$	$\mathcal{A}$
B	$\mathcal{B}$	$\mathcal{b}$	$\mathfrak{B}$	$\mathfrak{b}$	$\mathcal{B}$	$\mathcal{B}$
C	$\mathcal{C}$	$\mathcal{c}$	$\mathfrak{C}$	$\mathfrak{c}$	$\mathcal{C}$	$\mathcal{C}$
D	$\mathcal{D}$	$\mathcal{d}$	$\mathfrak{D}$	$\mathfrak{d}$	$\mathcal{D}$	$\mathcal{D}$
E	$\mathcal{E}$	$\mathcal{e}$	$\mathfrak{E}$	$\mathfrak{e}$	$\mathcal{E}$	$\mathcal{E}$
F	$\mathcal{F}$	$\mathcal{f}$	$\mathfrak{F}$	$\mathfrak{f}$	$\mathcal{F}$	$\mathcal{F}$
G	$\mathcal{G}$	$\mathcal{g}$	$\mathfrak{G}$	$\mathfrak{g}$	$\mathcal{G}$	$\mathcal{G}$
H	$\mathcal{H}$	$\mathcal{h}$	$\mathfrak{H}$	$\mathfrak{h}$	$\mathcal{H}$	$\mathcal{H}$
I	$\mathcal{I}$	$\mathcal{i}$	$\mathfrak{I}$	$\mathfrak{i}$	$\mathcal{I}$	$\mathcal{I}$
J	$\mathcal{J}$	$\mathcal{j}$	$\mathfrak{J}$	$\mathfrak{j}$	$\mathcal{J}$	$\mathcal{J}$
K	$\mathcal{K}$	$\mathcal{k}$	$\mathfrak{K}$	$\mathfrak{k}$	$\mathcal{K}$	$\mathcal{K}$
L	$\mathcal{L}$	$\mathcal{l}$	$\mathfrak{L}$	$\mathfrak{l}$	$\mathcal{L}$	$\mathcal{L}$
M	$\mathcal{M}$	$\mathcal{m}$	$\mathfrak{M}$	$\mathfrak{m}$	$\mathcal{M}$	$\mathcal{M}$
N	$\mathcal{N}$	$\mathcal{n}$	$\mathfrak{N}$	$\mathfrak{n}$	$\mathcal{N}$	$\mathcal{N}$
O	$\mathcal{O}$	$\mathcal{o}$	$\mathfrak{O}$	$\mathfrak{o}$	$\mathcal{O}$	$\mathcal{O}$
P	$\mathcal{P}$	$\mathcal{p}$	$\mathfrak{P}$	$\mathfrak{p}$	$\mathcal{P}$	$\mathcal{P}$
Q	$\mathcal{Q}$	$\mathcal{q}$	$\mathfrak{Q}$	$\mathfrak{q}$	$\mathcal{Q}$	$\mathcal{Q}$
R	$\mathcal{R}$	$\mathcal{r}$	$\mathfrak{R}$	$\mathfrak{r}$	$\mathcal{R}$	$\mathcal{R}$
S	$\mathcal{S}$	$\mathcal{s}$	$\mathfrak{S}$	$\mathfrak{s}$	$\mathcal{S}$	$\mathcal{S}$
T	$\mathcal{T}$	$\mathcal{t}$	$\mathfrak{T}$	$\mathfrak{t}$	$\mathcal{T}$	$\mathcal{T}$
U	$\mathcal{U}$	$\mathcal{u}$	$\mathfrak{U}$	$\mathfrak{u}$	$\mathcal{U}$	$\mathcal{U}$
V	$\mathcal{V}$	$\mathcal{v}$	$\mathfrak{V}$	$\mathfrak{v}$	$\mathcal{V}$	$\mathcal{V}$
W	$\mathcal{W}$	$\mathcal{w}$	$\mathfrak{W}$	$\mathfrak{w}$	$\mathcal{W}$	$\mathcal{W}$
X	$\mathcal{X}$	$\mathcal{x}$	$\mathfrak{X}$	$\mathfrak{x}$	$\mathcal{X}$	$\mathcal{X}$
Y	$\mathcal{Y}$	$\mathcal{y}$	$\mathfrak{Y}$	$\mathfrak{y}$	$\mathcal{Y}$	$\mathcal{Y}$
Z	$\mathcal{Z}$	$\mathcal{z}$	$\mathfrak{Z}$	$\mathfrak{z}$	$\mathcal{Z}$	$\mathcal{Z}$

*Varies with different compositors.

8.7 APPENDIX G: INFORMATION SHEET FOR COMPOSITOR

Conventions for copyediting mathematics are different from other material because of the great number of symbols and alphabets that are used. The information sheet is designed to aid the compositor in understanding the conventions used by the publisher.

An information sheet is included for every paper or chapter. Its purpose is to clarify notation and to list all mathematical variables and symbols for the compositor. If a symbol is not listed, the compositor should not use it unless he is positive that it was just missed by the copy editor. For example, on one manuscript an italic x was handwritten throughout. The compositor set it as Greek kappa in some places and as Greek chi in others. A check of the notation sheet would have shown that neither Greek kappa nor Greek chi was included and many errors (charged to the compositor) could have been avoided.

8.7.1 Copyediting conventions used

Latin letters. Letters used as mathematical symbols are set in italic (for example, X, Y, Z, a, b, c) unless underlined in orange to indicate roman type.

Numerals. Mathematical numerals are always set upright (for example, $5 + 2x - 3y$), not in italic. Numerals used in the numbering of headings follow the style of the publication.

Greek. The copy editor marks Greek letters only if it is not clear which Greek letter is intended. (Sometimes, however, the manuscript has been marked by the author.)

Exception: The following three Greek letters are always underlined in red to distinguish them from similar mathematical symbols.

Greek Letter	If not underlined, it is a special font.	Special Font Number (list when available)
Σ	$\sum$ (summation)	____
Π	$\prod$ (product)	____
ε	$\in$ (member sign)	____

Circles and zeros. All circles, near circles, and "ohs" should be set as zero unless marked for italic or for mathematical symbols.

Boldface. When symbols are marked for boldface, a bold italic font is preferred, though bold roman is also acceptable.

Symbols. Whenever the compositor's font numbers are available, they should be used on the information sheet to make identification easier.

Intersections and unions come in two sizes. The small $\cap$ and $\cup$ are not marked; the big $\bigcap$ and $\bigcup$ are marked as "large" or by the font number. Treat $\wedge$ and $\vee$ in the same manner, as well as symbols like $\oplus$ and $\otimes$.

Superscripts and subscripts. Positioning is not marked when it is clear. When a symbol has both a superscript and a subscript, use one of the following conventions.

Set all superscripts directly above the subscripts, unless they are marked otherwise on the manuscript.

When the superscript and subscript each include only one symbol, stagger the indices, setting the superscript to the right of the subscript; otherwise, set one above the other.

8.7.2 Color markings on the manuscript

The following color conventions are used by the copy editor. If the author has used a different convention, it should be indicated on the manuscript and repeated on the information sheet.

Underlining in orange	roman (i.e., not italic)
Underlining in red	Greek
Underlining in green	German
Underlining in blue or black	italic
Circled in blue	script

8.7.3 Leading

No space other than normal leading should be used between paragraphs or between lines in text unless the manuscript is marked with a $>$. Use about 6 extra points of space when extra leading is indicated.

8.7.4 Fractions, special markings

The handmarking in $\diagup\!\!\!\!\!\!\diagdown \frac{(n-1)}{2} \diagup\!\!\!\!\!\!\diagdown$ means to typeset the fraction with a slash as $(n-1)/2$.

9

Glossary

This glossary includes printing terms, mathematical terms, and technical terms. It is not a complete glossary of these subjects but rather a list of words used in this book that might not be familiar to some readers.

Author packages. Instructions and style files provided to authors by publishers for typesetting manuscripts.

Back matter. Material following the text, includes indexes, bibliographies, glossaries, and appendixes.

Base line. In type the imaginary line connecting the bottoms of the capital letters.

Boldface. A thick, heavy version of a type face. In some fonts it is available in both an upright and slanted face, for example, **X**, **Y**, **Z** and ***X***, ***Y***, ***Z***.

Broadside. A broadside page, sometimes called "landscape", is one which is read at a 90° angle from the usual page in the publication.

Camera copy (Reproduction proof). Proof that is sent to the printer.

Caps. An abbreviation for "capital letters".

Caps and small caps. Two sizes of capital letters which are available in the same font and are used together. Often used in mathematics for headings such as THEOREM and COROLLARY, or to indicate emphasis.

Collective sign. A term used to describe a certain group of mathematical symbols including sums, products, unions, and integrals. See §3.2.1.

Composition. The setting of a manuscript into type.

Copy editor. One who prepares manuscript for composition, including correcting spelling and grammar, checking for consistency of style, and improving legibility when required.

Copyholder. A person who reads manuscript aloud to the proofreader.

Cover. Outside binding or case of a book or journal, whether it be paper, plastic, or cloth bound. The front cover, inside front cover, inside back cover, and outside back cover are often designated as covers 1, 2, 3, 4, respectively.

DOI, Digital Object Identifier. A system for uniquely identifying a piece of digital material and providing persistent linking.

DVI. Device-independent formatted TEX output file.

Editor. In this book editor refers to one who selects and accepts manuscripts for publication based on mathematical content.

Em (or em quad). A unit of linear measurement equal to the point size of the type font being used. In many fonts an em is about equal to the width of a capital M.

Embellished letter. A letter which is distinguished either above or below by symbols such as accents, bars, dots, or tildes.

En (or en quad). One half an em.

Enunciations. Mathematical statements such as theorems, lemmas, corollaries, and propositions.

Fence. Any one of several signs of aggregation such as brackets, [ ], or braces, { }. See §3.2.1 for a more complete list.

Final proof. Proof which has been corrected. See Proof.

First order indices. See Indices.

First proof. A first set of proof which may be printed in galleys or in page lengths. See Proof.

Folio. Page number.

Font. A complete assortment of type in one face and size, including lower case, capitals, small capitals, numbers, and punctuation.

Most type fonts have a slanted version called *italic* and a thick version known as **boldface**.

Front matter (Preliminaries). Material preceding the text, including title page, foreword, preface, and contents. Folios are usually in roman numerals.

Galley proof. A first set of proof that is produced in long pages. See Proof.

Half title. The title of the book, or a shortened title, which appears alone on a page preceding the title page.

Handwork. Composition requiring the use of an artist and/or the knife rather than keyboarding only.

Header. A file of instructions or macros in which definitions are given for the specifications of a document's output.

HTML, Hypertext Markup Language. A tagging system that enables linking in electronic documents.

Indices. Subscripts and superscripts which are inferior and superior, respectively, to the symbols on the base line. There are two classes of indices—first order and second order.

In the term x_a^b, a and b are first order indices. Subscripts and superscripts on the first order indices are referred to as *second order indices*.

For example, in the expression

$$x_{a_c^d}^{b_e^f}$$

c, d, e, and f are second order indices (a and b are still first order indices). Ordinarily first order indices are set in smaller type than base line characters and second order indices are even smaller. If a 10-point type is being used, the first order indices may be in 8-point and the second order indices in 6-point type.

Italic. A slanted version of a type font, for example, *italic*. Letters used to represent mathematical variables are almost universally printed in an italic type face (X, Y, Z); exceptions, particularly those in logic, should be especially noted for the compositor.

Justified lines. A line in which the word and/or letter spacing is varied in order to give a definite measure to each line. This usually results in printed material with straight margins at both left and right.

Keyboard. As a noun it is the array of keys used for composing copy. As a verb it refers to the act of hitting the keys for composition.

Keyboarder. The person composing material by using the keyboard.

Leading. Vertical spacing in typesetting. The term originates from the Monotype system of typesetting where an actual piece of lead is inserted between lines of type.

The most common leading between lines of type is 2 point, but other sizes can be used; some mathematics is set with 10-point type and a 3-point leading. A 6-point leading is common between sections and before and after displayed material in mathematical copy.

Line weight. Thickness of a drawn line in a graphic.

Macros (TEX). Macros are control sequences used to define strings of words or mathematical expressions and are of two sorts: A "control word" is an escape character (\) followed by one or more letters, followed by a space or something besides a letter. A "control symbol" is an escape character (\) followed by a single nonletter symbol.

Makeup. See Page Makeup.

Matrix (in mathematics). A rectangular array of mathematical terms written between fences.

Measurement. The printer's basic unit of measurement is the *point*, which is .01384 inches or approximately 1/72 of an inch.

Twelve points make a *pica*, approximately 1/6 of an inch.

The *em* or *em quad* is a variable unit of space equal to the point size of the type face with which one is working. In mathematics a 10-point type is used frequently—in this situation an em would equal 10 points.

Monograph. A learned treatise on a particular subject.

Offprint. A separate printing of an article which has appeared in a book or a journal. Offprints are often provided free or at a modest price to authors.

Operator A mathematical symbol that indicates an operation to be performed. See §3.2.1.

Page charges. A charge made by some journals to cover the cost of publishing research; the bill usually is sent to the institution employing the author rather than to the individual. Publication is not usually dependent upon payment of this charge.

Page makeup. The arranging of lines of type, including displays and illustrations, into page lengths.

PDF, Portable Document Format. A standard file format for electronic document distribution and printing.

Pica. A unit of typographic measure. About 1/6 of an inch. See Measurement.

PII, Publisher Item Identifier. A unique identifying number assigned to an article by the publisher.

Point (as type size). The basic unit of typographic measure (.01384 inches or approximately 1/72 of an inch). Twelve points equal one pica. See Measurement.

Point (in proofreading). The word used to designate a period at the end of a sentence or before a decimal.

POD, Print-on-demand. Use of a digital printer to produce copies one-by-one and in the quantity needed at a given time. File transfer or scanning technology is used to feed material into the digital printer. The electronic files can be stored and reused when additional copies are needed.

Printer's errors. Typographical errors made by the compositor are called *printer's errors*. In marking first proof for return to the compositor, printer's errors are often indicated in a color different from that used to indicate the author's errors and changes, because printing contracts based on a per page charge usually include the correction of compositor errors but not author changes.

Production editor. Used in this book to describe the individual who is responsible for processing a particular book or journal from accepted manuscript to publication. See §1.2.

Proof. A *galley proof* is an impression made from the type as it stands in a long metal tray called a galley; the term galley proof is now generally used to refer to any set of first proof that is produced in long sheets.

First proof can be either in the form of a galley or in page length; when in page length it is usually referred to as first proof.

Final proof is the last set of proof received before camera copy. It is the last proof stage for detecting errors.

Reproduction proof refers to proof that is sent to the printer.

Proofreader. A person who checks printed proof for errors.

Proofreader's marks. An almost universally accepted code of markings for use in marking errors on proof.

PS, PostScript. A high-level programming language for text and graphics.

Referee. A mathematician whom the editor asks to review a manuscript and decide whether or not it should be accepted for publication. Often the referee is anonymous.

Reprint. To print a work a second or subsequent time without making any significant changes.

Reproduction proof. See Proof.

Rule. A line used as a separator. In mathematical work this is usually a straight line, although it can be decorative.

Run in. To merge a paragraph, a line, or a display with the preceding and/or succeeding text.

Running head. A headline placed at the top of a page as an aid to the reader. It may contain items such as the following: the title of the chapter, section, or other subdivision of the work; author's name, particularly in a work which has papers by several authors; page numbers.

Sans Serif. A typeface that is perfectly plain, without serifs (A, B, C).

Screen. A technique for transforming a solid-color or continuous-tone image into an equivalent dot pattern for printing; the density of the resulting image is usually specified as a percentage of the solid color.

Script. A typeface that resembles handwritten characters ($\mathcal{A}$, $\mathcal{B}$, $\mathcal{C}$).

Second order indices. See Indices.

Sinkage. The distance from the level of the top line of a full text page to the first line of type on a page.

Solidus. A slanted line used between the parts of a fraction such as 3/4. Also referred to as a *slant* or a *slash*.

Spacing. Lateral spacing (printers refer to vertical spacing as *leading*). To make a uniform nomenclature that can be used in any size type, the printer uses as a base the em quad (also referred to just as an em). This is the square of the point size of the font being used. If a 10-point font is employed, then an em is 10 points, but it can be 9 points, 18 points, or any other size in which type is available. The em quad is used as a base for the following space sizes:

two-em quad (which is twice an em)
three-em quad (which is three times as wide as an em)
en quad (half an em quad)

When spaces smaller than an en are used, the copy editor is not concerned with accuracy to the same degree as a printer and therefore is more apt to use terms like the following:

thick space (about 1/3 of an em)
thin space (about 1/6 of an em)

The terms "thick" or "thin" are not usually used when marking manuscript but are used in proof when it is obvious that the compositor used either too little or too much space.

Stacked fraction. A fraction in which the numerator is set above a rule, while the denominator is set below the rule, in contrast to a fraction set with a solidus (or slant).

Stripping. Making corrections to reproduction proof by cutting and pasting. It may be referred to as "stripping in corrections".

Style (House style). House rules of uniformity concerning matters of spacing, punctuation, capitalization, etc. In mathematics this includes the manner of treating sections, enunciations, bibliography, and displays.

Style files. A set of headers that facilitate production for particular books and journals to the specifications set up by the publisher.

Subscript. A small symbol (or symbols) that prints partly below the base line of the text. See Indices for comments on subscripts of the second order.

Superscript. A symbol that prints above the height of a lower case x; its size is smaller than that of on-the-line symbols. Superscripts may be of either first or second order; the second order superscript prints higher and is of a smaller size than a first order superscript. See Indices.

Symbol. A letter of any alphabet or any special character that is used in mathematics to represent a variable, a constant, a function, or other mathematical term.

Thick space. About 1/3 of an em. See Spacing.

Thin space. About 1/6 of an em. See Spacing.

Three-em quad. Three times the width of an em quad.

Two-em quad. Twice the width of an em quad.

Type size. Usually designated by points. Refers to the height of the body on which type is cast rather than the actual size of the printed letter. For instance, letters printed in 10-point type fonts are generally of about the same size but not exactly. In the same font, type sizes are exactly proportional in height, an 18-point type being exactly twice as high as a 9-point type.

In designating size, reference is usually made not only to the type size but to the leading between lines. "10 on 12", a common size for mathematical composition, means a 10-point type with a 2-point leading; "10 on 13" gives a more spacious effect because of greater space between lines; "10 on 10" results in a very squeezed appearance and is difficult to read.

Typeset. To set into type. To compose.

VDP, Variable Data Printing. The printing of individualized information in documents or promotional material.

Widow. A short line at the end of a paragraph is called a widow if it is placed at the top of a page. It is avoided in good typography.

WWW. World Wide Web.

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Mathematics into Type

Updated Edition

Ellen Swanson

This edition, updated by Arlene O'Sean and Antoinette Schleyer of the American Mathematical Society, brings Ms. Swanson's work up to date, reflecting the more technical reality of publishing today. While it includes information for copy editors, proofreaders, and production staff to do a thorough, traditional copyediting and proofreading of a manuscript and proof copy, it is increasingly more useful to authors, who have become intricately involved with the typesetting of their manuscripts.

Features:

- Maintains the same user-friendly presentation as the original work.
- Serves as a training tool for newcomers to mathematical publishing.
- Includes a glossary.

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