1041-34-128        **Iwan Jensen*** (`I.Jensen@ms.unimelb.edu.au`), Department of Mathematics and Statistics, The University of Melbourne, Melbourne, Victoria 3010, Australia. *Fuchsian ODE searches using modular arithmetic.*

Counting the number of combinatorial objects and finding their generating functions can be computationally very challenging and expensive when done using the exact numbers. Doing similar calculations modulo a prime can be orders of magnitude faster. Here we review some recent work concerning the numerical search for Fuchsian ODEs mod a prime underlying series stemming from problems from combinatorics and statistical physics. Specifically we focus on a problem related to the magnetic susceptibility of the Ising model. For the five-particle contribution $\chi^{(5)}$ we calculated the first 10000 terms of the series modulo a single prime and we used this series to find the Fuchsian ODE satisfied by $\chi^{(5)}$ modulo the prime. Knowledge of the ODE modulo a prime will generally suffice to determine the singularities and associated exponents. In the process we have discovered a surprising linear relationship between the order of the ODE, the minimal degree of the polynomials entering the ODE at a given order and the number of terms required to specify the ODE at that order. (Received August 07, 2008)