1047-37-197   **Lev Glebsky** and **Evgeny I Gordon*** (`yigordon@eiu.edu`), Department of Math&CS, Eastern Illinois University, 600 Lincoln Ave, Charleston, IL 61920, and **C Ward Henson**. *What does Birkhoff's Ergodic Theorem mean for a big finite set?* Preliminary report.

The trivial proof of the ergodic theorem for a finite set X and a permutation $\sigma : X \to X$ shows that for an arbitrary function $f : X \to \mathbb{R}$ the sequence of ergodic means $A_n(f, \sigma)$ stabilizes for $n \gg |X|$. We show that if $|X|$ is very large and $|f(x)| \ll |X|$ for almost all x, then $A_n(f, \sigma)$ stabilizes for significantly long segments of very large numbers n that are, however, $\ll |X|$. This statement has a natural rigorous formulation in the setting of nonstandard analysis, which is, in fact, equivalent to the ergodic theorem for infinite probability spaces. Its standard formulation in terms of sequences of finite probability spaces is complicated. We also discuss some other properties of the sequence $A_n(f, \sigma)$ for a very large finite $|X|$ that can be easily formulated in terms of sequences of finite spaces. (Received January 29, 2009)

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