1067-60-2076 **Peter Gacs*** (gacs@bu.edu), Computer Science Department, Boston University, 111 Cummington Street, Boston, MA 02215. *A constructive law of large numbers with applications.*

Let $X_1, X_2, \ldots$ be a sequence of identically distributed, pairwise independent nonnegative integer random variables with distribution P. Let the expected value be $\mu < \infty$. Let $S_n = \sum_{i=1}^{n} X_i$. It is well-known that S_n/n converges to μ almost surely. We show that this convergence is effective in (P, μ). In particular, if P, μ are computable then the convergence is effective. On the other hand, if the convergence is effective in P then μ is computable from P.

This theorem can be used to show an effective renewal theorem, which then can be used to prove an effective ergodic theorem for countable Markov chains. The last result is a special case of effective ergodic theorems proven by Avigad-Gerhardy-Towsner and Galatolo-Hoyrup-Rojas, but we hope that the direct constructivization of the probability-theory proofs is still useful. (Received September 22, 2010)