1107-37-374 **Joseph Rosenblatt*** (`joserose@iupui.edu`), 402 N. Blackford St., LD270, Indianapolis, IN 46202-3216. *Optimal Norm Approximation in Ergodic Theory.*

Given an ergodic transformation τ, and a mean-zero $f \in L_r(X)$, $1 \leq r < \infty$, the ergodic averages $A_n^\tau f = \frac{1}{n}\sum_{k=1}^{n} f \circ \tau^k$ converge in L_r-norm to zero. However, for a fixed value of n, there could be other powers $m_1, \ldots, m_n$ such that the norm $\|\frac{1}{n}\sum_{k=1}^{n} f \circ \tau^{m_k}\|_r$ is much smaller than the norm $\|\frac{1}{n}\sum_{k=1}^{n} f \circ \tau^k\|_r$. For specific functions and transformations, with n fixed, we seek to compute, or estimate, the infimum of the norms $\|\frac{1}{n}\sum_{k=1}^{n} f \circ \tau^{m_k}\|_r$. Various aspects of dynamical systems come into play here including the asymptotic vanishing of correlations for weakly mixing maps, the behavior of discrete spectrum maps, and constructions using diophantine approximation. One general fact does hold: for the generic dynamical system, given in addition the generic function, the usual ergodic averages are infinitely often very far from giving the optimal L_2-norm approximation, and yet at the same time the usual ergodic averages are infinitely often very close to giving the optimal L_2-norm approximation. (Received January 19, 2015)