DISCRETE PROBABILITY MEASURES ON $2 \times 2$ STOCHASTIC MATRICES AND A FUNCTIONAL EQUATION ON $[0, 1]$

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Abstract: In this paper, we consider the following natural problem: suppose $\mu_1$ and $\mu_2$ are two probability measures with finite supports $S(\mu_1), S(\mu_2)$ respectively, such that $|S(\mu_1)| = |S(\mu_2)|$ and $S(\mu_1) \cup S(\mu_2) \subset 2 \times 2$ stochastic matrices, and $\mu_1^n$ (the $n$-th convolution power of $\mu_1$ under matrix multiplication), as well as $\mu_2^n$, converges weakly to the same probability measure $\lambda$, where $S(\lambda) \subset 2 \times 2$ stochastic matrices with rank one. Then when does it follow that $\mu_1 = \mu_2$? What if $S(\mu_1) = S(\mu_2)$? In other words, can two different random walks, in this context, have the same invariant probability measure? Here, we consider related problems.

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