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An operator on the L^2 space of a finite measure is called stochastic in case it maps the constant one function to itself and sends nonnegative functions to nonnegative functions. In the case of the unit interval with Lebesgue measure the extreme points of the set of stochastic operators consist of all composition operators, and the weakly closed convex hull of the composition operators contains all stochastic operators. This generalizes a classical theorem for matrices. One can also formulate a definition of stochastic operators on the Hardy space and ask for an analogous theorem in that setting. (Received February 21, 2006)