

Stochastic Processes, HW4

Turn-in problems

1(a) Consider a random walk that can not only step up or down but also stay where it is. Suppose that it steps up with probability $p > 0$, down with probability $q > 0$, and stays where it is (jumps back to itself) with probability r where $p + q + r = 1$.

Describe this random walk in a transition graph. For what values of p, q, r is it irreducible? Aperiodic? Recurrent?

(b) Now suppose that $p < q$. Find $P_0(\tau_1 < \infty)$ expressed in terms of p and q (no r ; condition on the first step).

(c) In the same problem, suppose that $p > q$. Find $E_0[\tau_1]$ expressed in terms of p and q (not r ; condition on the first step).