Problem 14.1

Compute the mean recurrent time to the absorbing state using the embedded MC, of the chain used in item 13.1.D. Compare the result with the expected value obtained in item 13.1.D.

Problem 14.2

Compute the mean recurrent time to the absorbing state using the embedded MC, of the chain used in problem 13.2.B. Compare the result with the expected value obtained in item 13.2.B.

Problem 14.3

Assume a CSMA/CA MAC protocol, similar to problem 12.4, but where nodes in backlogged state transmit continuously a *backlogged-tone* (in a non interfering channel). When a thinking node wants to transmit a packet and sense the backlogged-tone, it defers the transmission and enters in backlogged state. When a backlogged node wants to transmit a packet, it does the transmission if the medium is idle (even if the backlogged-tone is sensed). Assume 2 nodes and parameters $\mu = 1$, $\lambda = 1/4$ and $\alpha = 3/4$.

14.3.A Consider the 2-dimensional Markov chain with states (i, j), where i is the number of nodes transmitting a packet, and j is the number of nodes in backlogged state. Build the state transition diagram and the rate matrix. Use an appropriated embedded Markov chain to compute the following items.

14.3.B Given a a node enters in backlogged state, compute the probability that the node enters in backlogged state upon listening the backlogged-tone.

14.3.C Given a a node enters in backlogged state, compute the probability that the node enters in backlogged state upon listening the medium busy.