EE5137 Stochastic Processes: Problem Set 7
Assigned: 05/03/21, Due: 12/03/21

There are three (3) non-optional problems in this problem set to give you time to prepare for quiz 2.

1. Exercise 4.1 (Gallager's book)
2. Exercise 4.2 (Gallager's book)
3. A spider and a fly move along a straight line in unit increments. At any point in time, two events happen. First, the spider always moves towards the fly by one unit. The fly then moves towards the initial position of the spider by one unit with probability 0.3, move away from the spider by one unit with probability 0.3 and stays in place with probability 0.4. The initial distance between the spider and the fly is integer. When the spider and the fly land in the same position, the spider captures the fly.
   (a) Construct a Markov chain that describes the relative location of the spider and fly.
   (b) Identify the transient and recurrent states.

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4. (Optional) Exercise 4.3 (Gallager's book)
5. (Optional) Exercise 4.8 (Gallager's book)
6. (Optional) Consider a Markov chain with states $1, 2, \ldots, 9$ and the following transition probabilities.

$$P_{12} = P_{17} = 1/2, \qquad P_{i,i+1} = 1, \quad i \neq 1, 6, 9 \qquad P_{61} = P_{91} = 1.$$

   Is the recurrent class of the chain periodic?