Due on Thursday October 12 at the beginning of lecture. Problems are from the Probability Models book (same numbering in both the 10th and 11th editions).

1. Chapter 4, Problem 13

2. Chapter 4, Problem 14 (Use R!)

3. For each of the Markov chains given in Problem 14, state whether a stationary distribution exists, and if so, what it is.

4. Chapter 4, Problem 23

5. Chapter 4, Problem 35

6. Write an algorithm in R to simulate the Gambler’s ruin problem for general $p$ and $N$. For illustration, use $p = 0.4$ and $N = 10$ and have the code compute and output the following items to the screen:

   (a) Transition matrices $P$ and $P_T$ (the latter being the matrix corresponding to transient state transition probabilities only).

   (b) The matrix of mean time spent in transient states, $S$.

   (c) The expected amount of time the gambler has $7$, given that they started with $4$.

   (d) The probability that starting with $3$, the gambler reaches $9$ before going broke.

   (e) **BONUS:** The probability that starting with $1$, the gambler reaches $N = 10$ before going broke.

Include your R code along with the answers to the items listed above.