1. Complete the following problems from the textbook:

   - Section 1.1: 1e, 2
   - Section 1.2: 1, 5, 8, 11, 15, 19, 26, 32, 34

2. Suppose residents in a particular town have two meal options: eating at Monk’s Cafe or eating at home. For any particular person in town, there are two states in this system: state #1 = “the person eats at Monk’s tonight” and state #2 = “the person eats at home tonight”. Further, suppose that:

   - If a person eats at Monk’s tonight, there is a probability of 0.05 that she will eat at Monk’s again tomorrow, and a probability of 0.95 that she will eat at home.
   - If a person eats at home tonight, there is a probability of 0.9 that she will eat at home again tomorrow, and a probability of 0.1 that she will eat at Monk’s.

Let the matrix $P$ have entries $p_{i,j} =$ “the probability that the system moves from state # $i$ to state # $j$, from one day to the next” for $i = 1, 2$, $j = 1, 2$.

(a) Write down $P$ for this problem.

(b) The $(i, j)$ entry of matrix $P^n = PP \ldots P$ gives the probability that the system moves from state # $i$ to state # $j$ on the $n$th day. For example, the $(1, 1)$ entry of $P^5$ gives the probability that a person eats at Monk’s on day five given that that person ate at Monk’s on day four. What is the probability that one eats at Monk’s on day three given that one ate at Monk’s on day two? (HINT: You will have to compute $n$ matrix multiplications and interpret the entries. What should $n$ be?)