1 Exercises from the book

- Chapter 3: 37, 41, 49, 54

- Chapter 4: 1, 2, 3, 10

2 Exercise 1

Simulate (using `R` or `Matlab`) a Markov chain with state space $\Omega = \{1, 2, \ldots, n\}$ with given transition matrix P. Use as initial distribution a uniform distribution on Ω.

3 Exercise 2

Consider Example 4.4 on page 193 of the book. Given it **did not rain** on Monday and Tuesday what is the probability that it rains on Thursday?

4 Exercise 3

Consider a Markov chain $\{X_n, n = 0, 1, 2, \ldots\}$ with state space $\Omega = \{A, B\}$ and stationary transition matrix

$$
\begin{array}{c c}
 & \begin{array}{c c} A & B \end{array} \\
\begin{array}{c} A \\ B \end{array} & \begin{pmatrix} 0.2 & 0.8 \\ 0.6 & 0.4 \end{pmatrix}
\end{array}
$$

The initial distribution is given by $P(X_0 = A) = 0.3$ and $P(X_0 = B) = 0.7$. Compute

a) $P(X_3 = A)$

b) $P(X_3 = A | X_0 = A)$

c) $P(X_3 = A | X_1 = B, X_0 = A)$

d) $P(X_3 = A | X_2 = B, X_1 = B, X_0 = A)$

e) $P(X_6 = A | X_3 = A)$

f) $P(X_3 = A | X_6 = A)$