1. (Lecture 35) The probability that a missionary’s mail arrives on any given day is $p = 0.1$.
   a) How many days would the missionary expect to wait until the third mail arrival?

   b) What is the probability that the third arrival will come on the 11th day?
   Hints:
   - Binomial PMF with parameters $p$ and $n$: $p_X(k) = \binom{n}{k} p^k (1 - p)^{n-k}$, for $k = 0, 1, 2, \ldots, n$
   - Pascal PMF of order $k$: $p_{Y_k}(t) = \binom{t-1}{k-1} p^k (1 - p)^{t-k}$, for $t = k, k + 1, \ldots$

2. (Lecture 36) Assume that your e-mail arrives as a Poisson process with a rate of $\lambda = 0.5$ messages per hour. You check your e-mail every four hours.
   Hint: Poisson with parameter $\lambda \tau$: $p_{N_{\tau}}(k) = e^{-\lambda \tau} \frac{(\lambda \tau)^k}{k!}$, for $k = 0, 1, \ldots$
   a) What is the probability of getting 4 messages?

   b) In one period you check your e-mail after two hours and receive no messages. In the next two hours what is the probability of getting 4 messages?

3. (Lecture 37) The following state diagram describes a person’s health every day. The transition probabilities are given next to the paths between states.

```
Healthy 0 1 2
0.9 0.15 0.8
0.1 0.05 1.0
0 1 2
Dead
```

Suppose the person is healthy today (Day 0). What is the probability that on Day 3 the person will be dead?