

EXERCISE 1: Consider an infinite Markov chain where the elements p_{ij} of the transition probability matrix P are given by

$$p_{00} = p_{01} = 1/2 \quad (1)$$

$$p_{i0} = \frac{1}{i+1}, p_{i,i+1} = \frac{i}{i+1}, i = 1, 2, 3, \dots \quad (2)$$

Complete the following tasks:

1. draw the probability transition diagram and describe the characteristics of the Markov chain and those of its states;
2. classify the Markov chain states;
3. calculate $p_i^{(\infty)}$, $i = 0, 1, 2, \dots$.

