3.5.2

a)

$$\begin{aligned} p_i &= \frac{a_{i+1}}{\sum_{j=1}^{\infty} a_{i+j}} \\ q_i &= 1 - p_i = \frac{\sum_{j=2}^{\infty} a_{i+j}}{\sum_{j=1}^{\infty} a_{i+j}} \end{aligned}$$

b)

$$p_i = \begin{cases} \frac{a_{i+1}}{\sum_{j=1}^{\infty} a_{i+j}} & i < N \\ 1 & i = N \\ 0 & else \end{cases}$$

$$q_i = 1 - p_1$$