3.7.4

a)

$$W = \begin{cases} 0 & j > i \\ 1 & j = i \\ \frac{1}{j+1} & j < i \end{cases}$$

b) The entries of W are

$$W_{ij} = E[\sum_{n=0}^{T-1} \mathbf{1}\{X = j\} | X_0 = i]$$

the expected amount of visits to state j starting in i. The system starts with probability p_i^0 in state i and is reaching the absorbing state from state j with probavilty p_{j0}

$$P(X_{T-1} = j, X_T = 0) = \sum_i p_i^0 W_{ij} p_{j0}$$

all we are missing now is the inital distribution.