

3.8.2

From (3.96) we know

$$\begin{aligned} E[X_{n+1}] &= \mu E[X_n] \\ &= \mu^{n+1} \end{aligned}$$

Therefore we can calculate

$$\begin{aligned} Z &= \sum_{n=0}^x X_n \\ &= \sum_{n=0}^{\infty} X_n \quad \text{assume } X_n = 0 \quad \forall n > x \\ \rightarrow E[Z] &= \sum_{n=0}^{\infty} E[X_n] \\ &= \sum_{n=0}^{\infty} \mu^n \\ &= \frac{1}{1-\mu} \end{aligned}$$