**THE CHINESE UNIVERSITY OF HONG KONG**
**Department of Statistics**

**STAT3007: Introduction to Stochastic Processes**
**Markov Chains - Some Special Examples - Exercises**

1. (Exercise 3.5.8 in Pinsky and Karlin) Consider a discrete-time queuing model in which at most a single customer arrives in any period and at most a single customer completes service. Suppose that in any single period, a single customer arrives with probability $\alpha$, and no customers arrive with probability $1 - \alpha$. Provided that there are customers in the system, in a single period a single customer completes service with probability $\beta$, and no customers leave with probability $1 - \beta$. Let $X_n$ be the number of customers in the system at the end of period $n$. Find the transition probability matrix for this Markov chain.

2. (Exercise 3.5.9 in Pinsky and Karlin) In a simplified model of a certain television game show, suppose that the contestant, having won $k$ dollars, will at the next play have $k + 1$ dollars with probability $q$ and be put out of the game and leave with nothing with probability $p = 1 - q$. Suppose that the contestant begins with one dollar. Model her winnings after $n$ plays as a Markov chain by specifying the transition probability matrix.

**THE END**