**MMAT 5340 Assignment #7**
**Please submit your assignment online on Blackboard**
**Due at 23:59 p.m. on Tuesday, Mar.19, 2024**

1. Consider a Markov chain $X = (X_n)_{n \geq 0}$ with state space $S = \{1, 2, 3, 4\}$ and transition matrix

$$\begin{bmatrix} 0.2 & 0.4 & 0 & 0.4 \\ 0.3 & 0 & 0.7 & 0 \\ 0.5 & 0 & 0.5 & 0 \\ 0 & 0.1 & 0.9 & 0 \end{bmatrix}$$

   (a) Which states are transient and which are recurrent?

   (b) Is this markov chain irreducible or reducible?

2. Consider a Markov chain $X = (X_n)_{n \geq 0}$ with state space $S = \{1, 2, 3\}$ and transition matrix

$$\begin{bmatrix} 0.5 & 0 & 0.5 \\ 0 & 1 & 0 \\ 0.4 & 0 & 0.6 \end{bmatrix}$$

   (a) Which states are transient and which are recurrent?

   (b) Is this markov chain irreducible or reducible?