Week in Review # 9

1. \[ T = \begin{bmatrix} A & B & C \\ 0.4 & 0.8 & 0.3 \\ B & 0.5 & 0.1 & 0 \\ C & 0.1 & 0.1 & 0.7 \end{bmatrix} \]

2. (a) not a stochastic matrix. the sum of column 1 is greater than 1.
(b) no, since the labels of the rows and columns are not the same.
(c) not a stochastic matrix since it is not square.
(d) it is a stochastic matrix.

3. (a) If starting in state B, there is an 80% chance that you will stay in state B after 1 iteration of the markov process.
(b) 0.6
(c) \[ X_1 = TX_0 = \begin{bmatrix} A \\ B \end{bmatrix} \begin{bmatrix} 0.26 \\ 0.74 \end{bmatrix} \]
   After 1 iteration of the markov process, 26% in in state A and 74% is in state B.
(d) If starting in state B, there is an 75.2% chance that you will stay in state B after 3 iteration of the markov process.
(e) 74.4%

4. (a) State S = strenuous workout
State M = moderate workout
State L = light workout
\[ T = \begin{bmatrix} S & M & L \\ 0.4 & 0.4 & 0.3 \\ M & 0.6 & 0.25 & 0.2 \\ L & 0 & 0.35 & 0.5 \end{bmatrix} \]
(b) \[ X_2 = \begin{bmatrix} U \\ T \\ A \end{bmatrix} = \begin{bmatrix} 0.26 + 0.74 \end{bmatrix} \]
   38.05% + 23.15% = 61.2%
(c) 37.585%

5. (a) State U = the University Bookstore
State T = Textbooks for Less
State A = A-plus Books
\[ T = \begin{bmatrix} U & T & A \\ 0.8 & 0.05 & 0.05 \\ T & 0.1 & 0.7 & 0.20 \\ A & 0.1 & 0.25 & 0.75 \end{bmatrix} \]
(b) \[ X_3 = T^3X_0 = \begin{bmatrix} 0.284375 \\ 0.32875 \\ 0.386875 \end{bmatrix} \]
   Answer: 32.875
(c) \[ X_6 = T^6X_0 = \begin{bmatrix} 0.235596 \\ 0.346074 \\ 0.418330 \end{bmatrix} \]
   Answer:
   23.5596% for the University Bookstore
   34.6074% for Textbooks for Less
   41.8330% for A-plus Books