MA 322 - 09

Assignment 5

1. A rental car company has three locations in Lexington. One at the airport, one downtown, and one on Nicholasville road. 95% of cars rented at the airport are returned there, 2% are returned downtown and 3% on Nicholasville road. Of cars rented downtown, 80% are returned there, 15% are returned at the airport and 5% are returned on Nicholasville road. Of cars rented at the Nicholasville road location, 90% are returned there and the remaining 10% are retuned at the airport.
   (a) What matrix describes the movement of cars between locations?
   (b) If the company has a fleet of 90 cars and there are 30 at each location on Monday morning, how many cars are at the airport on Thursday morning?
2. Find a 2×2 nonzero matrix B (with two different columns) so that $\begin{bmatrix} 3 & -6 \\ -1 & 2 \end{bmatrix} B$ is the zero matrix.
3. Suppose A and B are matrices and AB is defined.
   (a) If the second column of B is all zeros what can you say about the second column of AB?
   (b) If the second column of AB is all zero and B has no columns that entirely consists of zeros what can you say about the columns of A?
4. If A is a $3 \times n$ matrix whose columns span $\mathbb{R}^3$, describe how to find a $n \times 3$ matrix D so that $AD = I_3$.
5. Show that if $ad - bc = 0$ then the equation $\begin{bmatrix} a & b \\ c & d \end{bmatrix} \vec{x} = \vec{0}$ has more than one solution.
6. Let $A = \begin{bmatrix} 1 & 1 & 1 & 0 \\ 0 & 1 & 1 & 1 \end{bmatrix}$. Construct a 4×2 matrix D using only 1 and 0 entries so that $AD = I_2$. Is it possible for $CA = I_4$ for some 2×4 matrix C? (Justify your answers!)