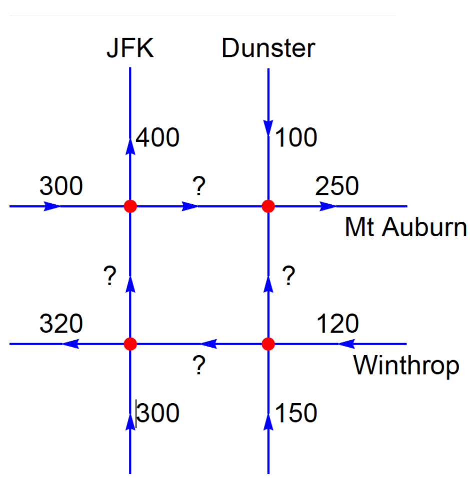
Math 22A (De Loera) **Homework 2**
Due date: Friday, Jan 25 2019 at 11:59pm

INSTRUCTIONS

This homework is worth 5 points. It consists of the WEBWORK problems I assigned PLUS the problems I wrote below. By presenting solutions of ALL WEBWORK problems you will receive up to 3 points (depends of how many you get right). One problem below will be graded for correctness for 1 point. You will get one more point if you do all the problems below.

Write legibly but preferably use word processing if your hand-writing is unclear. If you send a photograph it better be legible and send one photo per problem with name of problem clearly indicated. Be organized and use the notation appropriately. Show your work on every problem. Correct answers with no support work will not receive full credit.

1. AS ALWAYS: Do all WEBWORK problems assigned. This time they are in Strang W02. Read Chapter 2 of Strang. (worth 3 points).
2. Use the techniques you learned to solve the following problems from Section 2.1 of book: (8,20,27). No Matlab!
3. Use the techniques you learned to solve the following problems from Section 2.2 of book: (12,18, 26, 32) No Matlab!
4. Use the techniques you learned to solve the following problems from Section 2.3 of book: (3, 7,10, 16) No Matlab!
5. The traffic flow on certain streets is shown in the figure (arrows represent flow of traffic and numbers the amount of cars)



Assuming that the total traffic leaving an intersection is the amount entering it, what can you say about the traffic at the four locations indicated by question marks? What is the highest and the lowest possible traffic volume at each location? Remember traffic amounts can only make sense as positive values. No Matlab!

6. Row reduce, by hand only no Matlab allowed, the matrices below

$$\text{a) } A = \begin{bmatrix} 3 & -1 & -1 & -1 & 0 & 0 & 0 \\ -1 & 1 & 0 & 0 & 0 & 0 & 0 \\ -1 & 0 & 1 & 0 & 0 & 0 & 0 \\ -1 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 2 & 1 & 1 \\ 0 & 0 & 0 & 0 & 1 & 2 & 1 \\ 0 & 0 & 0 & 0 & 1 & 1 & 2 \end{bmatrix}, \text{ b) } B = \begin{bmatrix} 0&0&0&0&0&0&0&0 \\ 1&0&0&0&0&0&0&0 \\ 1&1&0&0&0&0&0&0 \\ 1&1&1&0&0&0&0&0 \\ 1&1&1&1&0&0&0&0 \\ 1&1&1&1&1&0&0&0 \\ 1&1&1&1&1&1&0&0 \\ 1&1&1&1&1&1&1&0 \end{bmatrix}$$

7. How many solutions are there on a system of equations? Well, it will depend on the matrix A that defines the system, but also on the right-hand side vector b. Explore the following concrete situation:

Given $A = \begin{bmatrix} 1&2&3&4&5 \\ 2&3&4&5&6 \\ 3&4&5&6&7 \\ 4&5&6&7&8 \\ 5&6&7&8&9 \end{bmatrix}$. For each of the vectors $\vec{b}$ given below, determine whether the system $A\vec{x} = \vec{b}$ has $0, 1$ or ∞ many solutions.

$$\text{a) } \vec{b} = \begin{bmatrix} 1\\2\\3\\4\\5 \end{bmatrix} \quad \text{b) } \vec{b} = \begin{bmatrix} 1\\2\\3\\2\\1 \end{bmatrix} \quad \text{c) } \vec{b} = \begin{bmatrix} 1\\1\\1\\1\\1 \end{bmatrix} \quad \text{d) } \vec{b} = \begin{bmatrix} 0\\0\\0\\0\\0 \end{bmatrix} \quad \text{e) } \vec{b} = \begin{bmatrix} 0\\0\\0\\0\\1 \end{bmatrix}$$