## Homework assignment #1

**Problem 1.** Interpret each equation of the following system as a line in the plane. Graph the lines and determine geometrically the number of solutions.

$$\begin{cases} x_1 + x_2 = 4\\ x_1 - x_2 = 2 \end{cases}$$

**Problem 2.** Interpret each equation of the following system as a line in the plane. Graph the lines and determine geometrically the number of solutions.

$$\begin{cases} x_1 + x_2 = 1\\ x_1 - x_2 = 1\\ -x_1 + 3x_2 = 3 \end{cases}$$

**Problem 3.** Solve a system of linear equations

$$\begin{cases} x_1 + 2x_2 - x_3 = 1\\ 2x_1 - x_2 + x_3 = 3\\ -x_1 + 2x_2 + 3x_3 = 7 \end{cases}$$

Problem 4. Solve a system of linear equations

$$\begin{cases} 3x_1 + 2x_2 + x_3 = 0\\ -2x_1 + x_2 - x_3 = 2\\ 2x_1 - x_2 + 2x_3 = -1 \end{cases}$$

**Problem 5.** The following matrix is the augmented matrix of a system of linear equations in variables  $x_1, x_2, x_3, x_4$ . Find the solution set to the system.

$$\begin{pmatrix} 1 & 2 & 0 & 1 & | & 5 \\ 0 & 0 & 1 & 3 & | & 4 \end{pmatrix}$$

Problem 6. Use Gauss-Jordan reduction to solve the following system:

$$\begin{cases} x_1 + 3x_2 + x_3 + x_4 = 3\\ 2x_1 - 2x_2 + x_3 + 2x_4 = 8\\ 3x_1 + x_2 + 2x_3 - x_4 = -1 \end{cases}$$

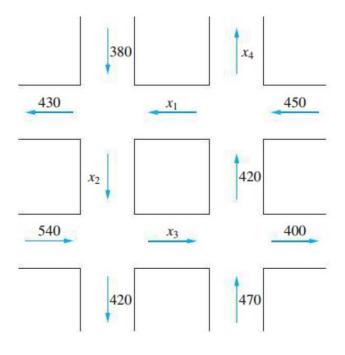
Problem 7. Use Gauss-Jordan reduction to solve the following system:

$$\begin{cases} x_1 + x_2 + x_3 = 0\\ x_1 - x_2 - x_3 = 0 \end{cases}$$

**Problem 8.** The following matrix is the augmented matrix of a system of linear equations. For what values of the parameter *a* will the system have a unique solution?

$$\begin{pmatrix} 1 & 2 & 1 & | & 1 \\ -1 & 4 & 3 & | & 2 \\ 2 & -2 & a & | & 3 \end{pmatrix}$$

**Problem 9.** Determine the values of  $x_1, x_2, x_3, x_4$  for the following traffic flow diagram:



**Problem 10.** Determine the amount of each current for the following network:

