MATH 369 Homework 1

Due: Thursday January 31, in class.

1. Consider the system of equations

$$\begin{aligned} 3x + 5y &= 3 \\ 5x - 6y &= 0 \end{aligned}$$

   (a) Find all solutions of this system of equations (use any method you want).

   (b) Draw the lines described by the two equations and identify the point corresponding to your solution.

2. (a) Write down the equations for two parallel lines in $\mathbb{R}^2$.

   (b) Use the equations from (a) to write down a linear system in 2 unknowns which has no solutions.

3. The following system has an infinite number of solutions:

$$\begin{array}{rcrcrcr} x & + & 3y & - & z & = & -4 \\ 3x & + & 9y & - & 3z & = & -12 \\ -x & - & 3y & + & z & = & 4 \end{array}$$

   Use parametric equations to describe them.

4. Do problems #5, 6 in Section 1.2 of the textbook.

5. The following augmented matrices correspond to different systems of equations. For each matrix, decide whether the corresponding system has no solutions, one solution, or infinitely many solutions. Explain your reasoning.

   (a) $\left(\begin{array}{cccc|c} 1 & 0 & 0 & 0 & 1 \\ 0 & 1 & 0 & 0 & 2 \\ 0 & 0 & 1 & 0 & 3 \\ 0 & 0 & 0 & 1 & 1 \end{array}\right)$

   (b) $\left(\begin{array}{cccc|c} 1 & 2 & 1 & 1 & 5 \\ 0 & 0 & 6 & -9 & 3 \\ 0 & 0 & 0 & 10 & 10 \\ 0 & 0 & 0 & 0 & 0 \end{array}\right)$

   (c) $\left(\begin{array}{cccc|c} -1 & 1 & -1 & 1 & -1 \\ 0 & 1 & -1 & 1 & -1 \\ 0 & 0 & 1 & -1 & 1 \\ 0 & 0 & 0 & 0 & 1 \end{array}\right)$