Week 1
MATH 4A
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1.1.2 Give a geometric description of the following systems of equations.

(a)

$$-6x + 15y = -6$$
$$8x - 20y = 8$$

a) $\Rightarrow$ $-x + \frac{15}{6}y = -1$

$-x + \frac{20}{8}y = -1$

(b)

$$-6x + 15y = -6$$
$$8x - 20y = 11$$

$\frac{15}{6} = \frac{20}{8}$

$\Rightarrow$ these are coinciding lines.

(c)

$$-5x + 3y = -5$$
$$8x - 8y = -6$$

b). $-6x + 15y = -6$

$y = \frac{6}{15}x - \frac{6}{15} = \frac{2}{5}x - \frac{2}{5}$

$8x - 20y = 11$

$20y = 8x - 11$

$y = \frac{8}{20}x - \frac{11}{20} = \frac{2}{5}x - \frac{11}{20}$

$\Rightarrow$ parallel lines.

c). $-5x + 3y = -5 \Rightarrow 3y = 5x - 5 \Rightarrow y = \frac{5}{3}x - \frac{5}{3}$

$8x - 8y = -6 \Rightarrow 8y = 8x + 6 \Rightarrow y = x + \frac{3}{4}$

$\Rightarrow$ cross at a point.

1.1.3 Write the augmented matrix of the following system:

$$-49y - z = 2$$
$$-42x + 25z = -29$$
$$-6x - 9y + 88z = 33$$

$$\left[\begin{array}{ccc|c} 0 & -49 & -1 & 2 \\ -42 & 0 & 25 & -29 \\ -6 & -9 & 88 & 33 \end{array}\right].$$

1.1.5 Solve the following system with substitution or elimination:

$$2x - 6y = -17 \quad \Rightarrow x - 3y = -\frac{17}{2}$$
$$-3x + 9y = 24 \quad \Rightarrow x - 3y = \frac{24}{-3} = -8.$$

How many solutions are there?

1

$$-8 \neq -\frac{17}{2},$$

so system inconsistent, (i.e. no solution.)

1.1.7 Consider the following system:

$$12x + 12y = 6$$
$$24x + 24y = k$$

What must k be for the system to be consistent?

$$12x + 12y = 6 \iff 24x + 24y = 12$$

So $k = 12$!