Date _____

MTH 261
Linear Algebra
Spring 2017

Systems of Linear Equations

Find partners, and follow the instructions. You will not turn this in, but you must be working diligently to get attendance credit.

1. Solve the linear systems using an augmented matrix and row operations. Practice documenting exactly what row operations you use from one step to the next.

(a)
$$\begin{cases} x + 3y + z = 2 \\ -2x + 2y - 4z = -1 \\ -y + 3z = 1 \end{cases}$$

(b)
$$\begin{cases} 2x_1 - 2x_2 - x_3 = -3 \\ x_1 - 3x_2 + x_3 = -2 \\ x_1 - 2x_2 = 2 \end{cases}$$

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

(d) $\begin{cases} 2x_1 + 2x_2 - x_3 - x_4 = -3 \\ -x_2 + 3x_4 = 2 \end{cases}$

2. Give restrictions on a (like $a = 2$, $a \neq 0$, $a > 5$, etc.) so that this linear system is consistent. Use row operations as usual, but you will have to keep track of what happens with a symbolically.

$-x + 3y = a$

$2x - 6y = 3$

3. Give restrictions on a, b, and c (like $a + b = c$, $b - 2a \neq c$, etc.) so that this linear system is consistent. Use row operations as usual, but you will have to keep track of what happens with a, b, and c symbolically.

$$\begin{aligned} x - y + 2z &= a \\ 2x + y - z &= b \\ 4x + 2y + z &= c \end{aligned}$$

4. Find all values for a that would make the system inconsistent.

$$\begin{aligned} x - y &= 2 \\ 3x - 3y &= a \end{aligned}$$

5. Find all values for a that would make the system inconsistent.

$$\begin{aligned} 2x - y &= a \\ 6x - 3y &= a \end{aligned}$$

6. Find an equation of the form $y = ax^2+bx+c$ for the parabola passing through the three points $(0, 0.25)$, $(1, -1.75)$, and $(-1, 4.25)$. (From your perspective, a, b, and c are the variables that you are trying to solve for. Set up a system of linear equations using the points the parabola passes through.)

7. Find a cubic polynomial $ax^3 + bx^2 + cx + d$ whose graph passes through the points $(1, 5)$, $(2, 13)$, $(-1, 7)$, and $(-2, -7)$.