Solving Systems of Equations with TI83 and TI84 Graphing Calculators

We will use the Matrix application on the calculator. Matrices have rows and columns.
Rows are what we see across and columns are what we see up and down.
For example, in the matrix of numbers below there are 3 rows and 4 columns. We would call this a 3x4 matrix.

-5	3	6	4
-3	1	5	-5
-4	2	1	13

This matrix came from the systems of equations:

$$-5x+3y+6z=4$$

$$-3x+y+5z=-5$$

$$-4x+2y+z=13$$

You can see that the numbers in the first row correspond with the coefficients in the first equation. The numbers in the second row corresponded with the numbers in the second equation and the numbers in the third row corresponded with those in the third equation.

Entry Instructions:

2nd x^{-1} This will take you into the Matrix

Click on 1 and scroll to Edit

Put in the number of rows x columns then Enter

Now you are in the Matrix. Enter each number from the coefficients in the equations,
hit enter each time until all the rows and columns are filled

2nd Mode (Quit the Matrix)

2nd x^{-1} to reenter the Matrix

Scroll to Math, then scroll down to rref(

Hit enter

2nd x^{-1} to reenter the Matrix

Select the Matrix you were working on (for example 1: [A])

Enter

Now you will see rref([A]

Enter

You will see a new matrix that may look like this

1	0	0	-2
0	1	0	4
0	0	1	-3

The first column is x, the second y, and the third is z. This matrix tells us that 1x=-2, 1y=4, and 1z=-3. It is the solution to the three-by-three system we started with:

$$-5x+3y+6z=4$$

$$-3x+y+5z=-5$$

$$-4x+2y+z=13$$

If you solved this algebraically, you also would have arrived at the same solution where x=-2, y=4, and z=-3.

The Matrix can be used on two systems as well like:

$$2x+3y=3$$

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

You would enter the matrix as a 2x3

2	3	3
-3	5	5

Doing all the same entry steps, you would get

1	0	0
0	1	1

which means x=0 and y=1.

Infinitely Many Solutions occurs when two equations look different but are the same line. Algebraically you would see all variables eliminate and you would end up with 0=0. However, the Matrix will show this

1	-1.3333
0	0

No Solution occurs when lines are parallel (same slope different y-intercepts). Algebraically you would see the variables cancel and be left with two different numbers equal each. The Matrix would show this:

1	-.333333
0	0