Multiple Linear Systems WS Name:

New tools:
1. Interchange an y 2 equations
2. Multiply all terms by a number(except zero)
3. Add a multiple of a equation to another equation

1. Solve: (This is "row reduced", we can just back-substitute to solve)

$$\begin{array}{rcrcrcr} 4x & - & 3y & - & 2z & = & 21 \\ & & 6y & - & 5z & = & -8 \\ & & & & z & = & -2 \end{array}$$

2. Solve:(to make this row reduced),
   (a) swap the first two equations,
   (b) then get rid of the "x" in the other two by Adding -2*(Eq. 1) to Eq 2, and -2*(Eq 1) to Eq. 3.
   (c) To solve for y, divide Eq 2 by -4,
   (d) now eliminate the "y" in the third equation by Adding $-\frac{1}{4}$*(Eq. 2) to Eq. 3.
   (e) To solve for z, Divide Eq.3 by 3.
   (f) This is now in row reduced form, and you can now back substitute to find y and x)

$$\begin{array}{rcrcrcr} 2x & + & 4y & - & z & = & 7 \\ x & + & 4y & + & z & = & 0 \\ 2x & - & 4y & + & 2z & = & -6 \end{array}$$

3. Solve (try this yourself, if you get stuck, I have steps on the other side:

$$\begin{array}{rcrcrcr} x & + & y & - & z & = & -1 \\ 2x & + & 4y & + & z & = & 1 \\ x & - & 2y & - & 3z & = & 2 \end{array}$$

4. Solve (try this yourself, if you get stuck, I have steps on the other side:

$$\begin{array}{rcrcrcr} 5x & - & 3y & + & 2z & = & 3 \\ x & - & 11y & + & 4z & = & 3 \\ 2x & + & 4y & - & z & = & 7 \end{array}$$

Steps to solve number 3:

(a) It looks like the top equation already has one x already, so no need to exchange equations

(b) To clear out x from the other two equations, Add (-2)(Eq. 1) to Eq. 2 and then Add (-1)Eq. 1 to Eq. 3

(c) To get a single y, divide Eq. 2 by 2

(d) Now to clear out y from the last equation Add (6)(Eq.2) to Eq.3.

(e) To find z, divide Eq. 3 by 5

(f) Now use backward substitution to solve for y and then x.

Steps to solve number 4:

(a) It looks like the second equation already has one x already, so swap Eq. 1 and Eq. 2

(b) To clear out x from the other two equations, Add (-5)(Eq. 1) to Eq. 2 and then Add (-2)Eq. 1 to Eq. 3

(c) To get a single y, divide Eq. 2 by 52

(d) Now to clear out y from the last equation Add $\left(-\frac{1}{2}\right)$(Eq.2) to Eq.3.

(e) Now the last equation tells we have an *inconsistent* system: 0=7 is never true, so there is no unique solution for x, y and z (and so the graph of these three lines won't intersect at a point). Sometimes the system is *dependent*, in that case we would have had 0=0 as one of the equations