Solving Equations with Technology.

Consider a typical problem from this chapter.

Example 1:

$3x - 4(5x - 2) = 11 - 4x$

$3x - 20x + 8 = 11 - 4x$

$-17x + 8 = 11 - 4x$

Simplify the respective sides as one normally would **until it is time to get the variables on one side of the equation.**

Instead of moving the variables to one side and the constants to the other, move everything to the same side of the equation.

$0 = -4x + 17x + 11 - 8$

$0 = 13x + 3$

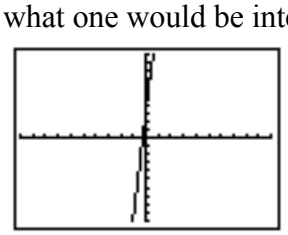
Notice that the equation is **zeroed** out. This actually sets up an idea known as finding **zeroes, roots, or solutions** to equations.

Next follow this procedure for finding solutions by graphing.

Step 1: Open the equation editor on the calculator by pressing the **"y ="** button on the left most side of the top menu.

Step 2: **Enter the non zero part** of the equation and then graph the result. In order to graph the equation press the **graph** button on the right most side of the top menu.

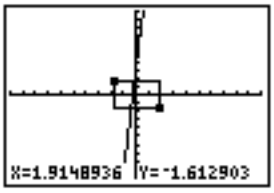
Step 3: Recall that any point on the x-axis is identified by an x-coordinate with some x-value and a **y-coordinate equal to zero**. So when y = 0, thats where the line intersects the x-axis. That is what one would be interested in finding.

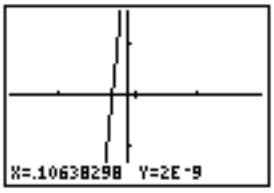


Step 4: **Procedure for Finding Zeros**

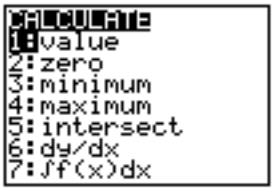
a. Press the **zoom** button on the middle of the top menu.

b. Select the **ZBox option**. This is the zoom box option. It will allow one to create a box that will be graphed as the new window. To create the box move the cursor by **using the arrow keys** on the calculator. The objective is too create a box the includes the x axis and the line that crosses thex-axis. As the cursor is moved to the left hit the **enter** button to engage the box then move to the right and down until the desired box is created. Next, press **enter a second time** to generate a window where the intersection has been zoomed in.



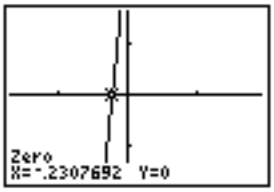


c. To find the zero, or solution to the problem press the **2nd botton** followed by **Trace** button. The trace button is second from the right on the top menu. This will call up the calculate menu.



Select option 2, the "zero" of a function.

d. The caluculator will prompt for a **Left Bound**, a **Right Bound**, and a **Guess.** Be sure that when the left boundary is selected the cursor has been moved to the l**eft of the point of intersection** by using the arrow buttons. Then press enter. The same should be done with the right boundary but making sure that the **cursor falls to the right of the point of intersection**. The "guess" just needs to be inside the boundaries. The calculator should then find the point of intersection.



This reports the decimal soulution to the equation.
x = .2308

Example 2:
Consider this beast of a problem. It is not necessary to simplify the expression but merely to ensure that all the terms are on one side of the equation. Enter the equation and repeat the prosedure outlined above.

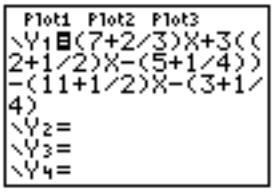
$$7\frac{2}{3}m + 3(2\frac{1}{3}m - 5\frac{1}{4}) = 11\frac{1}{2}m + 3\frac{1}{4}$$

$$7\frac{2}{3}m + 3(2\frac{1}{3}m - 5\frac{1}{4}) - 11\frac{1}{2}m - 3\frac{1}{4} = 0$$

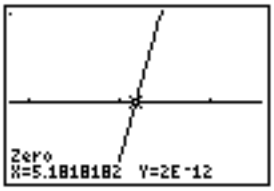
Note 1: On older calculators mixed numbers must be entered as an addition in parentheses.

Note 2: The calculator will only recognize x as a variable so it will be necessary to enter everything in terms of x.

Note 3: Be sure to balance the parentheses, particularly when the distributive property is involved. It may be in one's best interest to simplify the expression before entering it into the calculator.



For this problem, I had to **zoom out** until the intersection came into view.



Notice that the y-value is not exactly equal to zero. In decimal form that represents 0.000000000002, which is pretty darn close to zero. The x-value is what one is interested in so report **m = 5.1818**

PLEASE KEEP IN MIND THAT ONLY TECHNOLOGY PROBLEMS SHOULD BE REPORTED AS DECIMALS.

Technology Problems: Please read through instructional pages before attempting these problems.

1. $3k + 5 = 11k - 9$

1. _____

2. $4y - 16 = 3y - 9$

2. _____

3. $3t - 4 = 11(5t + 8) + 9$

3. _____

4. $3(2m - 7) = \frac{1}{3}m + 8$

4. _____

5. $7x - 13 = 5(11x - 2) + 4\frac{1}{2}x - 3\frac{1}{3}$

5. _____

6. $\frac{4}{5}z - 1\frac{3}{7}(5z - 13) = 11\frac{2}{3}z + 6$

6. _____

7. $\frac{2w + 5}{3} - \frac{8w - 7}{4} = \frac{11w + 3}{5}$

7. _____