Let us start with a circuit problem where systems of equations are common: (GRRCh18 - #52)

I have already labeled some junctions as well as assigned a direction to the current (remember this will only change the signs and will not affect the result).

So we start off by writing some equations:

Since we have 3 currents that are variables we need 3 equations.
This form has each of the variables in order on the left hand side of the equation, with their coefficients. The right hand side of the equation is any constants; plain numbers, or zero.

By re-arranging into this form, we can easily visualize the matrix we are creating and ensure we input it into the calculator correctly.

The re-arranged equations are:

1. $56I_1 + 22I_2 + 0I_3 = 5$
2. $56I_1 + 0I_2 + 75I_3 = 1$
3. $-1I_1 + 1I_2 + 1I_3 = 0$

So now we move to the calculator...

(These instructions are identical for TI-83/84)
First off we need to access the matrix menu, which is done by hitting the “2nd” button (the yellow button in the top left) and then hitting the inverse button ($x^{-1}$). You should now see something like this:
Scroll over to the edit button, and hit enter on the matrix you want to start editing to get to this screen:

In order to figure out this answer we need to use a 3 x 4 matrix. There are 3 rows and 4 columns (The 3 equations are the 3 rows, while the 3 variables and the constants are the 4 columns).

Your matrix should end up like this:

(Make sure you add negative signs for negative numbers)

(The final column is 5, 1, and 0, from top to bottom)
After creating the matrix we need to exit the matrix editor by doing “2nd” → “Mode” (Quit)

Afterwards, re-enter the matrix menu and head to the math sub-menu. Scroll down to the “rref(“ option.
Hit “enter” and then return back to the matrix menu and add the matrix name (Matrix A for this) by hitting the enter button.

Hit enter and then your screen should look like this:
The numbers on the far right are the values of each of the different variables (in this case the currents) depending on where the “1” is. The first column should be your first variable, the second column is your second variable, and the third column is your third variable.

Therefore, your currents for this problem should be:

\[ I_1 = 0.056 \]
\[ I_2 = 0.085 \]
\[ I_3 = -0.029 \]

(The negative value on \( I_3 \) shows that the direction chosen should be reversed)