SyMan Lesson 3: Solving Systems of Linear Equations, Part 1

In the previous exercise, you used SyMan's graphing capabilities to find the approximate point of intersection of two equations. In this exercise, you will learn to use SyMan to solve algebraically for the intersection point.

As you follow along with the example below, be sure to read the explanation after each step. These explanations tell you why you are doing each step, and give further helpful advice.

Step 1 **Enter and graph the two equations "`y = 3x`" and "`y = -x + 2`".**

Step 2 **Use the graph and mouse-crosshair coordinates to find the approximate point of intersection of the two lines:**

intersection point is (_____ , _____)

Step 3 **Re-enter the first equation, "`y = 3x`", and use the mouse to click on the "remem" button in the upper-left corner of the screen.**

You are trying to solve for the (x,y) values that correspond to the point of intersection for the two lines. You will need to use this first equation, `y = 3x`, so you must tell SyMan to remember it until you need it. You should see a message in the text window that says "Remembering y=3x"; this tells you that SyMan has stored the equation for use later.

Step 4 **Re-enter the second equation, "`y = -x + 2`".**

Step 5 **Use the mouse to click on the "y" button in the upper-left corner of the screen.**

SyMan will substitute the "`y = 3x`", the equation we told it to remember in step 3. The result is the equation "`3x = -x + 2`", which we can solve as we did in Lesson 1.

Step 6 **Solve the equation for 'x', then write this value in the space below:**

x = _____

Using the shortcut buttons in the top-left corner, you will have to eliminate the '`-x`' term on the right, simplify, then eliminate the coefficient in front of the '`x`' term, and simplify once more. Refer back to Lesson 1 if you don't remember how to do this.

Step 7 **Click on the "remem" button again.**

Now you need to find the y-value to go with the x-value you found. To do this, you need to use the x-value and one of the equations.

Step 8 **Re-enter the equation "`y = -x + 2`", then click on the "`x`" button in the upper-left corner. This will substitute the value for '`x`' from Step 6.**

When you substitute the x-value you found, you should end up with an equation that you can solve for 'y'.

Step 9 **Solve the equation for 'y', then, referring to the x-value you found in Step 6, write the complete (x,y) pair in the space below:**

algebraically-determined intersection point is (_____ , _____)

Why would it have been easier to use the equation "`y = 3x`" to find the y-value?

Step 10 **Compare the (x,y) pair you found in Step 2 to the (x,y) pair you found algebraically. Which is more correct, and why is it more correct?**

When you have completed Steps 1 through 10, go on to answer the following questions:

1.) Use SyMan to solve for the intersection points of the following pairs of lines; write the point of intersection in the space provided.

a) `y = 2x+1` and `y = -x-3` (_____ , _____)

b) `y = x-4` and `y = -5x+6` (_____ , _____)

c) `y = 7x+3` and `y = 2x+6` (_____ , _____)

d) `y = -9x+2` and `y = 2x+7` (_____ , _____)

e) `y = 10x+5` and `y = -2x+8` (_____ , _____)

2.) Use SyMan to solve for the intersection points of the following pairs of lines. In each case, you will have to solve the first equation for either 'x' or 'y' before you can "remem" and substitute into the second.

a) `y+2 = 3x+8` and `y+5 = -2x` (_____ , _____)

b) `y-4 = 4x-10` and `y+10 = 7x+4` (_____ , _____)

c) `y+5 = -8x+7` and `y-15 = 2x-4` (_____ , _____)

d) `y+9 = -2x+8` and `y-1 = 9x+7` (_____ , _____)

e) `y-8 = 6x-5` and `y+1 = -6x-9` (_____ , _____)

3.) Solve the following system of three equations in three unknowns.

`2x + 3y - z = -15` `x - y + z = 12` `-x + 5y + 4z = 16`

`x = _____ , y = _____ , z = _____`