

Day 2 - Solving Systems of Equations Using Addition and Subtraction

(Elimination)

Last day we solved the following with our calculators

$$\times 3 \text{ (1)} \quad 2x - y = -1$$

$$\times 5 \text{ (2)} \quad 3x + 3y = -6$$

$$(0.24, 0.16)$$

$$6x - 3y = -1$$

$$15x + 15y = -6$$

Multiply equation 1 by 3 and equation 2 by 5. Solve the system with your graphing calculator.

Add the two original equations together (in columns) and solve by graphing.

Subtract the two original equations from one another (in columns) and solve by graphing.

What do you notice about each???

Properties of linear systems:

- a. Multiplying both sides of either equation of a linear system by a constant does not change the solution.
  
- b. Adding or subtracting the equations of a linear system does not change the solution.

Using the properties of systems, multiply the first equation by 3 and add the equations to solve (this will eliminate one variable, allowing you to solve the problem).

$$\textcircled{1} \quad 2x - y = -1 \quad \times 3$$

$$\textcircled{2} \quad \begin{array}{l} 3x + 3y = -6 \\ + \quad 6x - 3y = -3 \end{array}$$

$$\frac{9x}{9} = \frac{-9}{9}$$

$$x = -1$$

$$\begin{array}{l} x \quad y \\ (-1) \quad (-1) \end{array}$$

$$2x - y = -1$$

$$2(-1) - y = -1$$

$$-2 - y = -1$$

$$-y = 1$$

$$y = -1$$

Solve the following systems by adding/subtracting:

$$\begin{array}{r} 4x + 3y = 8 \\ - \\ 4x - 5y = -24 \\ \hline \end{array}$$

$$8y = 32$$

$$y = 4$$

$$4x + 3(4) = 8$$

$$4x + 12 = 8$$

$$4x = -4$$

$$x = -1$$

Wolframalpha.com  $(-1, 4)$

$$2x - y = -1 \quad \times 3$$

$$7x - 3y = -5$$

$$\begin{array}{r} 7x - 3y = -5 \\ - \\ 6x - 3y = -3 \\ \hline \end{array}$$

$$x = -2$$

$$y = -3$$

$$(-2, -3)$$

The temperature at which water boils,  $T$  degrees Celsius, is a linear function of the altitude, " $a$ " metres, at which it is heated.

$$T = ma + b$$

In Banff, Alberta the altitude is 1383 m and water boils at  $95^{\circ}\text{C}$ . On Mount Logan, B.C. the altitude is 5951 m and water boils at  $80^{\circ}\text{C}$ . Determine the values of " $m$ " and " $b$ " then write  $T$  as a function of " $a$ ". Solve the system.

$$\begin{array}{r} 95 = 1383m + b \\ 80 = 5951m + b \end{array}$$

$$15 = -4568m$$

$$\frac{15}{-4568} = m$$

$$m = -0.0033$$

$$95 = 1383(-0.0033) + b$$

$$95 = -4.5639 + b$$

$$99.5639 = b$$

Assignment:  
Pg. 315 2odd, 6odd, 7, 8, 10, 16