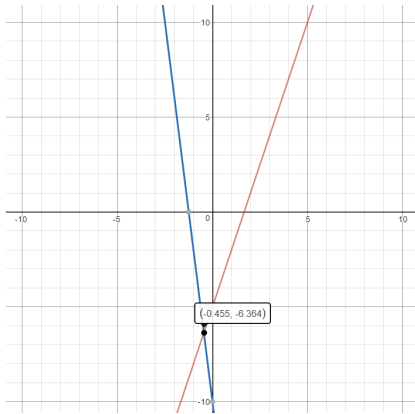


9.1: Substitution

November 16, 2016 10:37 AM

Using Desmos we can graph the following equations and find the solution

$$y = 3x - 5 \quad y = -8x - 10$$



To solve this without technology we have to use algebra.

Substitution Method

What do these equation mean?

$$y = 3x - 5 \quad y = -8x - 10$$

"y" is the same as "3x - 5" and "y" is the same as "-8x - 10"

It's just two different ways of representing the same quantity.



1 Trillion Dollars in gold coins (Great for swimming in)



1 Trillion dollar bill (Great for putting in pockets)

If two things are equal then they are interchangeable. A trillion gold coins is the same as a trillion dollar bill.

So for Substitution we simply exchange a variable for what it is equal to.

Ex: $y = 3x - 5$
 $y = -8x - 10$ → $y = -8x - 10$
 $3x - 5 = -8x - 10$ Now you use

replace "y" with what "y" equals

$$3x - 5 = -8x - 10$$

Now you use algebra to solve for x

$$3x - 5 = -8x - 10$$

$$+8x \quad +8x$$

$$11x - 5 = -10$$

$$+5 \quad +5$$

$$\frac{11x}{11} = \frac{-5}{11}$$

$$\frac{11x}{11} = \frac{-5}{11}$$

$$\boxed{x = -\frac{5}{11}}$$

$$y = 3x - 5$$

$$y = 3\left(-\frac{5}{11}\right) - 5$$

$$y = \frac{-15}{11} - 5\left(\frac{11}{11}\right)$$

$$y = \frac{-15 - 55}{11}$$

$$\boxed{y = -\frac{70}{11}}$$

Ex: $4x + 5y = 26$

$$3x = y - 9 \rightarrow \begin{matrix} 3x & = & y - 9 \\ +9 & & +9 \end{matrix}$$

$$3x + 9 = y$$

sub in for y

$$4x + 5y = 26$$

$$4x + 5(3x + 9) = 26$$

$$4x + 15x + 45 = 26$$

$$-45 \quad -45$$

$$\frac{19x}{19} = \frac{-19}{19}$$

$$\boxed{x = -1}$$

Solve for y now

$$3x = y - 9$$

$$3(-1) = y - 9$$

$$-3 = y - 9$$

$$+9 \quad +9$$

$$\boxed{6 = y}$$

Check

$$4x + 5y = 26$$

$$4(-1) + 5(6) = 26$$

$$-4 + 30 = 26$$

$$26 = 26 \checkmark$$

Ex: $2A + 3C = 80$

$$2A = 50$$

Sub $2A$ for 50

$$2A + 3C = 80$$

$$50 + 3C = 80$$

$$-50 \quad -50$$

$$\frac{3C}{3} = \frac{30}{3}$$

$$\underline{\underline{C = 10}}$$

Solve for A

$$2A = 50$$

$$\frac{2A}{2} = \frac{50}{2}$$

$$\underline{\underline{A = 25}}$$

check

$$2A + 3C = 80$$

$$2(25) + 3(10) = 80$$

$$50 + 30 = 80$$

$$\underline{\underline{80 = 80}}$$

$$C = 10$$

$$A = 25$$

Ex: $\frac{x}{2} = 5 - y$
 $x + y = 7$

$$\rightarrow \times 2 \rightarrow x = 10 - 2y$$

$$\hookrightarrow x + y = 7 \quad \text{sub in}$$

$$x + y = 7 \quad | \quad \text{check}$$

$$x + 3 = 7 \quad | \quad \frac{x}{2} = 5 - y$$

$$\hookrightarrow x + y = 7 \quad \leftarrow \text{sub in}$$

$$10 - 2y + y = 7$$

$$10 - 7 = y$$

$$\underline{\underline{3 = y}}$$

HW: Pg 474; Q: 2, 4, 5, 6, 9, 13, 23, 24, 26

$$x + 3 = 7$$

$$\underline{\underline{x = 4}}$$

$$\frac{x}{2} = 5 - y$$

$$\frac{4}{2} = 5 - 3$$

$$\underline{\underline{2 = 2}}$$

