2-4: Solving systems by Substitution

Objectives: I can solve a system by substitution and determine the number of solutions

I can verify a solution to a system

Vocabulary

Substitution: to put something in for something else, that does the same thing

Ordered Pair: (x, y)

$y =$ OR $x =$

Substitution

Verify that (2,-5) is a solution of $y = -4x + 3$

x, y

yes

$-5 = -4(2) + 3$

$-5 = -8 + 3$

$-5 = -5$

Solve the system by substitution:

$y = x - 3$

$2x + y = 0$

$y = 1 - 3 = -2$

$2(1) + y = 0$

$2 + y = 0$

$-2 \quad -2$

$y = -2$

$2x + x - 3 = 0$

$3x - 3 = 0$

$+3 \quad +3$

$\frac{3x}{3} = \frac{3}{3}$

$x = 1$

$(1, -2)$

Solve the system using ***Substitution***

a) $3x + y = -9$

$y = 2x + 1$

$3x + 2x + 1 = -9$

$5x + 1 = -9$

$-1 \quad -1$

$\frac{5x}{5} = \frac{-10}{5}$

$x = -2$

$y = 2(-2) + 1$

$y = -4 + 1$

$y = -3$

$(-2, -3)$

Solve the system by substitution

b) $4x + 5y = 11$

$y = 3x - 13$

$y = 3(4) - 13 = -1$

$4x + 5(3x - 13) = 11$

$4x + 15x - 65 = 11$

$19x - 65 = 11$

$+65 \quad +65$

$\frac{19x}{19} = \frac{76}{19}$

$x = 4$

$(4, -1)$

Solve the system by substituion

$$y = 2x - 5$$

$$2y = 4x - 10$$

$$2(2x-5) = 4x-10$$

$$4x - 10 = 4x - 10$$

Infinitely Many!

Solve the system by substituion

$$y = 4x - 1$$
$$y - 4x = 4x$$

$y = 4(-1/4) - 1 = -1 - 1 = -2$

$4x - 1 - 4x = 4x$

$(-1/4, -2)$

$-1 = 4x$

$-1/4 = x$

$-.25 = x$

Example: Is (1,3) a solution to the system $y-2x=1$ $y=-x+4$

x, y

$3-2(1)=1$ $3=-1+4$

$1=1$ ✓ $3=3$ ✓

Yes

Application: A store sold a total of 125 car stereo systems and speakers in one week. The stereo systems sold for $50, and the speakers sold for $10. The sales from these two items totaled $2250. How many of each item were sold?

Define the variables. x = stereos y = speakers

Write equations to represent total items sold and total sales.

Solve the system ~~to determine~~ how many speakers and car stereos were sold.

$-10(x + y = 125)$

$50x + 10y = 2250$

$-10x - 10y = -1250$

$40x = 1000$

$x = 25$

$25 + y = 125$

$-25 \quad -25$

$y = 100$

$y = 125 - x$

$50x + 10(125 - x) = 2250$

$50x + 1250 - 10x = 2250$

25 stereos

100 speakers

$40x + 1250 = 2250$

$-1250 \quad -1250$

$40x = 1000$

$x = 25$