Section 3.2: Solving a System using Elimination   Name: KEY

<u>How do I find the solution to a system of equations using elimination?</u>

1. Check to see if either the x's or y's will cancel (be ELIMINATED) when added together.

2. If no to #1, multiply each equation by a different number so that either x's or y's will cancel (be ELIMINATED) when added (must be same number with opposite signs).

3. Add 2 equations together to cancel (ELIMINATE) a variable. Solve remaining equation for that variable.

4. Plug the value you got for the variable you solve for in the previous step into either of the equations and solve for the second variable.

1.
$$-3x + 2y = 16$$
$$+ \quad 3x + 5y = 19$$
$$\overline{\quad 7y = 35}$$
$$y = 5$$

$$\longrightarrow \quad 3x + 5(5) = 19$$
$$3x + 25 = 19$$
$$3x = -6$$
$$x = -2$$

$$(-2, 5)$$

2.
$$2(6x - 5y = -26)$$
$$3(-4x + 7y = 32)$$
$$12x - 10y = -52$$
$$+ \quad -12x + 21y = 96$$
$$\overline{\quad 11y = 44}$$
$$y = 4$$

$$\longrightarrow \quad 6x - 5(4) = -26$$
$$6x - 20 = -26$$
$$6x = -6$$
$$x = -1$$

$$(-1, 4)$$

3.
$$-2(7x - 3y = -17)$$
$$7(2x - 4y = -6)$$
$$-14x + 6y = 34$$
$$+ \quad 14x - 28y = -42$$
$$\overline{\quad -22y = -8}$$
$$\frac{-22y}{-22} = \frac{-8}{-22}$$
$$y = \frac{4}{11}$$

$$\longrightarrow \quad 2x - 4\left(\frac{4}{11}\right) = -6$$
$$2x - \frac{16}{11} = -6$$
$$+\frac{16}{11} \quad +\frac{16}{11}$$
$$\frac{1}{2} \cdot 2x = \frac{-50}{11} \cdot \frac{1}{2}$$
$$x = \frac{-25}{11}$$

$$\left(-\frac{25}{11}, \frac{4}{11}\right)$$

HW: p. 146: #1, 8, 9, 11, 13, 33, 40, 55, 72

4. $x - 3y = 5$
         $2x = 6y + 10$

$-2(x - 3y = 5)$
$+2(2x - 6y = 10)$
$\rightarrow -2x + 6y = -10$
_____
$0 = 0$

infinitely many solutions

5. $3(-6x + 4y = 12)$
    $2(9x - 6y = 15)$

$-18x + 12y = 36$
$18x - 12y = 30$
_____
$0 = 66$

no solutions

6.   Write an system to find the missing numbers:
     "The sum of five times a number and three times another number is 52. The difference of nine times the first number and four times the second is 56.

$-9(5x + 3y = 52)$
$5(9x - 4y = 56)$

$-45x - 27y = -468$
$45x - 20y = 280$
_____
$-47y = -188$
$y = 4$

$\rightarrow 5x + 3(4) = 52$
$5x + 12 = 52$
$5x = 40$
$x = 8$

$(8, 4)$

7.   When Bob buys 8 drinks and 3 bags of popcorn at the movies, it costs \$32. Jane goes the same movie and buys 5 drinks and 2 bags of popcorn for \$20.50. How much does each drink and each bag of popcorn cost?

$-5(8x + 3y = 32)$
$8(5x + 2y = 20.50)$

$-40x - 15y = -160$
$40x + 16y = 164$
_____
$y = 4$

$\rightarrow 8x + 3(4) = 32$
$8x + 12 = 32$
$8x = 20$
$x = 2.50$

Drinks popcorn
$(2.50, 4)$