p. 39 #14, 12, 17

~~p. 26~~

12. Cost = $665, $1 gas/lawn
Revenue = $20/lawn
} C = R → break even

Let x be the # of lawns cut.

C = 665 + x
R = 20x
} C needs to equal R!

$$20x = 665 + x$$

14. Soy milk: x 0.005g of carbs, 0.030g protein
Veggies: y 0.14g " ", 0.030g "

50g carbs, 20g of protein

Let x be the amt of soy milk.
Let y be " " " veggies.

① Total carbs: $0.005x + 0.14y = 50$

② Total protein: $0.030x + 0.030y = 20$

$$0.030x = 20 - 0.030y$$

$$x = 667.67 - y$$

17. Let x be # nickels.
Let y be # of dimes.
Let z be # of quarters.

5 more dimes than all of the nickels + quarters.

① Total coins: $x + y + z = 49$

② Total value: $0.05x + 0.1y + 0.25z = \$5.20$

Nickels + quarters
$x + z + 5 = y$ ✓ dimes

Sub in for y in both equations

~~Tuesday, February 18, 2020~~ Wednesday, February 19, 2020

$2x+3y=20$
$+\ -2x+y=4$
$0+4y=24$
$4y=24$
$y=6$

1.6 Solving a Linear System Using Algebra - Elimination

When the coefficients of the same variable in both equations have the same (or opposite) value, you can eliminate that variable by subtracting (or adding) the two equations. You need to be sure that like terms are lined up before you add or subtract!

ex 1/ Add.

$x + y = 4$
$2x - y = 5$
$3x = 9$
$\frac{3x}{3} = \frac{9}{3}$
$x = 3$

ex 2/ Subtract.

$3x - 4y = 7$
$3x + 2y = 1$
$-6y = 6$
$\frac{-6y}{-6} = \frac{6}{-6}$
$y = -1$

If the coefficients are not the same, you can make them the same by multiplying

ex 3/ $-2x - y = 4$ ①
$3x + 2y = 5$ ②

① ×2 $-4x - 2y = 8$
② $3x + 2y = 5$

To eliminate y, should I add or subtract?

$-x = 13$
$\frac{-x}{-1} = \frac{13}{-1}$
$x = -13$

ex 4/ $2x + 4y = 6$ ①
$x - y = 4$ ② ×4

① $2x + 4y = 6$
+ ② ×4 $4x - 4y = 16$

$6x = 22$
$\frac{6x}{6} = \frac{22}{6}$
$x = \frac{11}{3}$

$2x+3y=20$
$-2x+y=4$
↑

Steps to Solve with Elimination:

1) Express both equations in the form ax + by = c.
2) Choose a variable to eliminate. Multiply one or both equations by an appropriate number to make the coefficients the same or opposite.
3) Add or subtract the equations.
4) Solve the resulting equation.
5) Sub this value into an original equation to get the other unknown.
6) Check.

Example: Solve using elimination.

① $2x + y = 3$ $\xrightarrow{\times 2}$ $4x + 2y = 6$
② $3x + 2y - 5 = 0$ $\rightarrow$ $3x + 2y = 5$

$-$

Sub $x = 1$ into ②

$3(1) + 2y = 5$

$3 + 2y = 5$

$2y = 2$

$\frac{2y}{2} = \frac{2}{2}$

$y = 1$

POI $(1, 1)$

Practice Problems:

Solve using elimination.

1) $2y = -3x + 13$
$-2x + 4y - 2 = 0$

$3x + 2y = 13$ ①
$-2x + 4y = 2$ ② $\div 2$

① $3x + 2y = 13$
② $\div 2$ $-x + 2y = 1$

$-$

$4x = 12$

$\frac{4x}{4} = \frac{12}{4}$

Sub $x = 3$ into ①

$2y = -3(3) + 13$

$2y = -9 + 13$

$\frac{2y}{2} = \frac{4}{2}$

$y = 2$

POI $(3, 2)$

2) $\frac{1}{2}x + \frac{1}{3}y = \frac{5}{6}$ ① $\times 6$
$\frac{1}{2}y + \frac{3}{4}x = \frac{5}{4}$ ② $\times 4$

① $\times 6$ $3x + 2y = 5$
② $\times 4$ $2y + 3x = 5$

$3x + 2y = 5$
$-$ $3x + 2y = 5$
$0 = 0$

Same line. Always intersect

3) Find the point of intersection of the graphs defined by the linear system provided below.

$3(x + 3) - 4y + 13 = 0$ (1) $\rightarrow 3x + 9 - 4y + 13 = 0$

$x + 4(y - 3) = 0$ (2)

$x + 4y - 12 = 0$

(2) $x + 4y = 12$

(1) $3x - 4y = -22$

(2) + (1) $x + 4y = 12$

$4x = -10$

$\frac{4x}{4} = -\frac{10}{4}$

Sub $x = -\frac{5}{2}$ into (2)

$-\frac{5}{2} + 4y = 12$

$-5 + 8y = 24$

$8y = 29$

$y = \frac{29}{8}$

4) Given the systems of equations below, determine if substitution or elimination is a more appropriate method of solving. Solve using the method that you choose.

a) elimination

$4x - 2y = 5$

$x - 2y = 2$

(−)

$3x = 3$

$x = 1$

$1 - 2y = 2$

$-2y = 1$

$y = -\frac{1}{2}$

b) Substitution

$y = 3x - 5$

$2x - 3y = 7$

$2x - 3(3x - 5) = 7$

$2x - 9x + 15 = 7$

$-7x = -8$

$x = \frac{8}{7}$

$y = 3\left(\frac{8}{7}\right) - 5$

$= \frac{24}{7} - \frac{35}{7}$

$= -\frac{11}{7}$