Solving Linear Systems by Substitution

Classwork – Day 2

Name __Key__

Date_____ Period _____

Kate asked Betty about the cost of boarding and grooming dogs at Doggy Hotel. Betty's receipt did not show the individual prices for boarding and grooming, but one receipt showed a total of $70 for one grooming and 5 days of boarding. Another receipt showed a total of $164 for two groomings and 12 days of boarding. Together they wrote this system of equations to find the individual costs of boarding and grooming.

$$\begin{cases} g + 5b = 70 \rightarrow g = (-5b + 70) \\ 2g + 12b = 164 \end{cases}$$

1. How is the system $\begin{cases} g + 5b = 70 \\ 2g + 12b = 164 \end{cases}$ different from the systems of equations we solved yesterday?

   Both equations are in Standard form

2. Which equation should be changed so the system can be solved using substitution? Rewrite that equation in the form needed for substitution.

   The first one, since 'g' has a coefficient of 1 ~~it's~~ the easiest

   $$g + 5b = 70$$
   $$\underline{\quad -5b \quad -5b}$$
   $$\boxed{g = -5b + 70}$$

3. Solve the system using substitution. Verify that your solution is correct.

   $$2g + 12b = 164$$

   DIST $2(-5b + 70) + 12b = 164$

   $$\frac{2b}{2} = \frac{24}{2}$$

   Now solve for g

   cir $-10b + 140 + 12b = 164$

   $$b = 12$$

   $$g = -5b + 70$$

   $$2b + 140 = 164$$
   $$\underline{\quad -140 \quad -140}$$
   $$2b = 24$$

   $$g = -5(12) + 70$$
   $$g = 10$$

   $$\boxed{(12, 10)}$$
   solution

4. In this situation, what does your solution represent?

   It represents that it costs $12 per day for boarding and $10 for each grooming

Steps for solving by substitution:

1. __Solve (rewrite)__ one of the equations to __isolate__ one of the variables. $X = (\ )$

2. __Substitute__ this expression into the __other__ equation.

3. __Solve__ the equation to get the value of the first __variable__

4. __Substitute__ that value into __either__ original equation and solve for the other variable.

5. Write the solution as an __ordered pair (x, y)__.

6. __Verify__ the solution.
   check

Linear Systems LS4 Homework

Solve the system of equations using substitution.

5. $\begin{cases} 4x + y = 0 \\ x + y = -3 \end{cases}$ $y = (-4x)$ $(+1, -4)$

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

$-3x = -3$

$x = 1$

$y = -4 (+1)$

$y = -4$

6. $\begin{cases} x + 2y = 3 \\ 2x + 4y = 6 \end{cases}$ $x = (-2y + 3)$

$2(-2y + 3) + 4y = 6$

$-4y + 6 + 4y = 6$

$6 = 6$

Infinitely many Solutions

7. $\begin{cases} 3x = 11 + y \\ 7x - 5y = -11 \end{cases}$ $y = (3x - 11)$

$7x - 5(3x - 11) = -11$

$7x - 15x + 55 = -11$

$-8x + 55 = -11$
$ -55 \quad -55$

$-8x = -66$

$x = 8.25$

$y = 3(8.25) - 11$

$y = 13.75$

$(8.25, 13.75)$

8. $\begin{cases} 3x + y = 4 \\ -3x = y - 7 \end{cases}$ $y = (-3x + 7)$

$3x + (-3x + 7) = 4$

$7 \neq 4$

No Solution