

**SOLVING LINEAR SYSTEMS USING SUBSTITUTION** Assignment

Find the solution of the following systems by substitution and determine if it is an independent, inconsistent or dependent system

$$1. \begin{cases} 2x + y = 3 \\ 5x - 2y = 4 \end{cases}$$

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

$$2. \begin{cases} 2x + 3y = 14 \\ x + 2y = 9 \end{cases}$$

$$7. \begin{cases} x = 3y - 1 \\ 3x - y = 2 \end{cases}$$

$$3. \begin{cases} 7x + 2y = 16 \\ -21x - 6y = 24 \end{cases}$$

$$8. \begin{cases} 5x + 2y = 8 \\ x - 1 = 4 \end{cases}$$

$$4. \begin{cases} 4x - 3y = 18 \\ y + 2 = 0 \end{cases}$$

$$9. \begin{cases} 2x + 4y = -6 \\ x = 1 - 2y \end{cases}$$

$$5. \begin{cases} -3x - 2y = -12 \\ y = 5x - 7 \end{cases}$$

$$10. \begin{cases} 5(x+1) - 2y = 1 \\ y = 2 + x \end{cases}$$

**SOLVING LINEAR SYSTEMS USING SUBSTITUTION** Assignment**ANSWERS**

Find the solution of the following systems by substitution and determine if it is an independent, inconsistent or dependent system

**1.**

**I.**  $2x + y = 3$       and      **II.**  $5x - 2y = 4$

We choose the equation which contains the easiest variable to solve. In this case we select to solve variable “y” from equation I and then substitute it in equation II to find the value of the other variable, like follows:

$$y = 3 - 2x$$

Substituting in II:

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

Applying distributive property:  $5x - 6 + 4x = 4 \rightarrow 9x = 10 \rightarrow x = \frac{10}{9}$

Now, we calculate the value of variable “y” by substituting the result of x into the equation  $y = 3 - 2x$

$$y = 3 - 2\left(\frac{10}{9}\right) = \frac{7}{9}$$

**Solution (10/9, 7/9). Independent System****2.**

**I.**  $2x + 3y = 14$       and      **II.**  $x + 2y = 9$

We choose the equation which contains the easiest variable to solve. In this case we select to solve variable “x” from equation II and then substitute it in equation I to find the value of the other variable, like follows:

$$x = 9 - 2y$$

Substituting in I:

$$2(9 - 2y) + 3y = 14$$

Applying distributive property:  $18 - 4y + 3y = 14 \rightarrow y = 4$

**SOLVING LINEAR SYSTEMS USING SUBSTITUTION** Assignment

Now, we calculate the value of variable “x” by substituting the result of y into the equation  $x = 9 - 2y$

$$y = 9 - 2(4) = 1$$

**Solution (1, 4). Independent System**

3.

$$\text{I. } 7x + 2y = 16 \quad \text{and} \quad \text{II. } -21x - 6y = 24$$

We choose the equation which contains the easiest variable to solve. In this case, both are equally difficult to solve, so we can select any of them. We select variable “y” from equation I and then substitute it in equation II to find the value of the other variable, like follows:

$$y = \frac{16 - 7x}{2}$$

Substituting in II:

$$-21x - 6\left(\frac{16 - 7x}{2}\right) = 24$$

$$\text{Applying distributive property: } -21x - 48 + 21x = 24 \quad \rightarrow \quad 0 = 72$$

**No Solution. Inconsistent System**

4.

$$\text{I. } 4x - 3y = 18 \quad \text{and} \quad \text{II. } y + 2 = 0$$

We choose the equation which contains the easiest variable to solve. In this case we select to solve variable “y” from equation II and then substitute it in equation I to find the value of the other variable, like follows:

$$y = -2$$

Substituting in I:

$$4x - 3(-2) = 18 \quad \rightarrow \quad 4x + 6 = 18 \quad \rightarrow \quad x = 3$$

**Solution (3, -2). Independent System**

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5.

$$\text{I. } -3x - 2y = -12 \quad \text{and} \quad \text{II. } y = 5x - 7$$

We choose the equation which contains the easiest variable to solve. In this case we select to solve variable “y” from equation I and then substitute it in equation II to find the value of the other variable, like follows:

$$y = 3 - 2x$$

Substituting in II:

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

$$\text{Applying distributive property: } 5x - 6 + 4x = 4 \rightarrow 9x = 10 \rightarrow x = \frac{10}{9}$$

Now, we calculate the value of variable “y” by substituting the result of x into the equation  $y = 3 - 2x$

$$y = 3 - 2\left(\frac{10}{9}\right) = \frac{7}{9}$$

**Solution (10/9, 7/9). Independent System**

6.

$$\text{I. } -3x + 3y = 4 \quad \text{and} \quad \text{II. } -x + y = 3$$

We choose the equation which contains the easiest variable to solve. In this case we select to solve variable “y” from equation II and then substitute it in equation I to find the value of the other variable, like follows:

$$y = 3 + x$$

Substituting in I:

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

$$\text{Applying distributive property: } -3x + 9 + 3x = 4 \rightarrow 0 = -5$$

**No Solution. Inconsistent System**

7.

**SOLVING LINEAR SYSTEMS USING SUBSTITUTION** Assignment

**I.**  $x = 3y - 1$  and **II.**  $3x - y = 2$

We choose the equation which contains the easiest variable to solve. In this case we select variable “x” from equation I and then substitute it in equation II to find the value of the other variable, like follows:

$$x = 3y - 1$$

Substituting in II:

$$3(3y - 1) - y = 2$$

Applying distributive property:  $9y - 3 - y = 2 \rightarrow 8y = 5 \rightarrow y = 5/8$

Now, we calculate the value of variable “x” by substituting the result of y into the equation  $x = 3y - 1$

$$x = 3\left(\frac{5}{8}\right) - 1 = \frac{7}{8}$$

**Solution (7/8, 5/8). Independent System**

8.

**I.**  $5x + 2y = 8$  and **II.**  $x - 1 = 4$

We choose the equation which contains the easiest variable to solve. In this case we select variable “x” from equation II and then substitute it in equation I to find the value of the other variable, like follows:

$$x = 4 + 1 \rightarrow x = 5$$

Substituting in I:

$$5(5) + 2y = 8$$

Solving for variable “y”:  $25 + 2y = 8 \rightarrow y = -\frac{17}{2}$

**Solution (5, -17/2). Independent System**

9.

**I.**  $2x + 4y = -6$  and **II.**  $x = 1 - 2y$

Name: \_\_\_\_\_ Period: \_\_\_\_\_ Date: \_\_\_\_\_

## SOLVING LINEAR SYSTEMS USING SUBSTITUTION Assignment

We choose the equation which contains the easiest variable to solve. In this case we select to solve variable “x” from equation II and then substitute it in equation I to find the value of the other variable, like follows:

$$x = 1 - 2y$$

Substituting in I:

$$2(1 - 2y) + 4y = -6$$

Applying distributive property:  $2 - 4y + 4y = -6 \rightarrow 0 = -6$

### No Solution. Inconsistent System

10.

$$\text{I. } 5(x+1) - 2y = 1 \quad \text{and} \quad \text{II. } y = 2 + x$$

We choose the equation which contains the easiest variable to solve. In this case we select to solve variable “y” from equation II and then substitute it in equation I to find the value of the other variable, like follows:

$$y = 2 + x$$

But first we have to order equation I:

$$5x + 5 - 2y = 1 \rightarrow 5x - 2y = -4$$

Substituting in I:

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

Applying distributive property:  $5x - 2(2 + x) = -4 \rightarrow 3x = 0 \rightarrow x = \frac{0}{3} = 0$

Now, we calculate the value of variable “y” by substituting the result of x into the equation  $y = 2 + x$

$$y = 2 + 0 = 2$$

### Solution (0, 2). Independent System