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SOLVING LINEAR SYSTEMS USING ELIMINATION Bell Work

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

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

2. $\begin{cases} x + y = 4 \\ 5x - 4y = 6 \end{cases}$

3. $\begin{cases} 4x + 3y = 0 \\ x + y = 5 \end{cases}$

4. $\begin{cases} 6x - y = 3 \\ 5x - 2y = -8 \end{cases}$

5. $\begin{cases} x - 3y = 4 \\ -2x + 6y = 5 \end{cases}$

6. $\begin{cases} 3x + 2y = 10 \\ 2x - y = 1 \end{cases}$

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ANSWERS

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

1.

I. 5x + 3y = -7 and II. x – 2y = 3

We interchange the "x" or "y" coefficients from equation I and equation II to eliminate one of the variables. In this case, we are going to interchange the "x" coefficients of both equations, like follows:

$$\begin{cases} 1(5x + 3y = -7) \\ -\ 5(x - 2y = 3) \end{cases}$$

As both coefficients have equal signs, we have to assign a negative sign to one of the coefficients so they can eliminate each other.

Applying distributive property:

$$\begin{cases} 5x + 3y = -7 \\ -5x + 10y = -15 \end{cases}$$

The result would be:

$$13y = -22 \qquad \rightarrow y = -\frac{22}{13}$$

The value of "x" is calculated from equation II

$$\mathrm{x} = 3 + 2\mathrm{x} \quad \rightarrow \mathrm{x} = 3 + 2\left(-\frac{22}{13}\right) \rightarrow \ x = -\frac{5}{13}$$

Solution (-5/13, -22/13). Independent System

2.

I. x + y = 4 and II. 5x – 4y = 6

We interchange the "x" or "y" coefficients from equation I and equation II to eliminate one of the variables. In this case, we are going to interchange the "x" coefficients of both equations, like follows:

$$\begin{cases} -5(x + y = 4) \\ 1(5x - 4y = 6) \end{cases}$$

As both coefficients have equal signs, we have to assign a negative sign to one of the coefficients so they can eliminate each other

Applying distributive property:

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$$\begin{cases} -5x - 5y = -20 \\ 5x - 4y = 6 \end{cases}$$

The result would be:

$$-9y = -14 \qquad \rightarrow y = \frac{14}{9}$$

Now, we calculate the value of variable "x" by substituting the result of "y" into the equation x = 4 - y

$$x = 4 - \frac{14}{9} = \frac{22}{9}$$

Solution (22/9, 14/9). Independent System

3.

I. 4x + 3y = 0 and II. x + y = 5

We interchange the "x" or "y" coefficients from equation I and equation II to eliminate one of the variables. In this case, we are going to interchange the "x" coefficients of both equations, like follows:

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

As both coefficients have equal signs, we have to assign a negative sign to one of the coefficients so they can eliminate each other

Applying distributive property:

$$\begin{cases} -4x - 3y = 0 \\ 4x + 4y = 20 \end{cases}$$

The result would be:

$$y = 20$$

Now, we calculate the value of variable "x" by substituting the result of "y" into the equation x= 5 - y

$$x = 5 - y = 5 - 20 = -15$$

Solution (-15, 20). Independent System

4.

I. 6x - y = 3 and II. 5x – 2y = -8

We interchange the "x" or "y" coefficients from equation I and equation II to eliminate one of the variables. In this case, we are going to interchange the "y" coefficients of both equations, like follows:

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$$\begin{cases} -2(6x - y = 3) \\ 1(5x - 2y = -8) \end{cases}$$

As both coefficients have equal signs, we have to assign a negative sign to one of the coefficients so they can eliminate each other.

Applying distributive property:

$$\begin{cases} -12x + 2y = -6 \\ 5x - 2y = -8 \end{cases}$$

The result would be:

$$-7x = -14 \quad \rightarrow x = 2$$

Now, we calculate the value of variable "y" by substituting the result of "x" into the equation y= 6x - 3

$$y = 6(2) - 3 = 9$$

Solution (2, 9). Independent System

5.

I. x - 3y = 4 and II. -2x + 6y = 5

We interchange the "x" or "y" coefficients from equation I and equation II to eliminate one of the variables. In this case, we are going to interchange the "x" coefficients of both equations, like follows:

$$\begin{cases} 2(x - 3y = 4) \\ 1(-2x + 6y = 5) \end{cases}$$

As both coefficients have different signs, we do not have to assign a negative sign to one of the coefficients so they can eliminate each other

Applying distributive property:

$$\begin{cases} 2x - 6y = 8 \\ -2x + 6y = 5 \end{cases}$$

The result would be:

$$0 = 13$$

No Solution. Inconsistent System

6.

I. 3x + 2y = 10 and II. 2x - y = 1

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We interchange the "x" or "y" coefficients from equation I and equation II to eliminate one of the variables. In this case, we are going to interchange the "y" coefficients of both equations, like follows:

$$\begin{cases} 1(3x + 2y = 10) \\ 2(2x - y = 1) \end{cases}$$

As both coefficients have different signs, we do not have to assign a negative sign to one of the coefficients so they can eliminate each other.

Applying distributive property:

$$\begin{cases} 3x + 2y = 10 \\ 4x - 2y = 2 \end{cases}$$

The result would be:

$$7x = 12 \quad \rightarrow x = \frac{12}{7}$$

Now, we calculate the value of variable "y" by substituting the result of "x" into the equation y= 2x - 1

$$y = 2\left(\frac{12}{7}\right) - 1 = \frac{17}{7}$$

Solution (12/7, 17/7). Independent System

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