

MAC 1105 Mediated Learning

Solving a System of 3 equations with three unknowns:

1. Take a pair of equations and eliminate one of the variables by adding the equations. The result will be a fourth equation.
2. Take a different pair of equations and eliminate the same variable as before. The result will be a fifth equation.
3. Take the fourth and fifth equation and eliminate one of the variables by adding. You will get the value of one of the variables.
4. Take the value found and replace into either equation 4 or 5. This will give you a value for a second variable.
5. Take these two values and plug into equation 1, 2, or 3 and find the third value.
6. These three values will be the solution.

Problems:

1.
$$\begin{aligned}x + y + z &= 0 \\x + 2y - 3z &= 5 \\3x + 4y + 2z &= -1\end{aligned}$$
 Answer: (5, -3, -2)

2.
$$\begin{aligned}x + y + 2z &= 11 \\x + y + 3z &= 14 \\x + 2y - z &= 5\end{aligned}$$
 Answer: (2, 3, 3)

3.
$$\begin{aligned}4x - y + 2z &= 11 \\x + 2y - z &= -1 \\2x + 2y - 3z &= -1\end{aligned}$$
 Answer: (2, -1, 1)

4.
$$\begin{aligned}2x + y - 2z &= -1 \\3x - 3y - z &= 5 \\x - 2y + 3z &= 6\end{aligned}$$
 Answer: (1, -1, 1)

$$\begin{array}{l}
 5. \quad x - y + 3z = 8 \\
 \quad \quad 3x + y - 2z = -2 \\
 \quad \quad 2x + 4y + z = 0
 \end{array}
 \qquad \text{Answer: } (1, -1, 2)$$

Problems like #6 may be worked a little different. In this problem you take equation 2 and 3 and eliminate the letter missing in equation 1 (z). Then take the new equation 4 and equation 1 and eliminate a letter. You will get one of the values. Take that value and insert it into equation 1 or 4 and get a second value. Take these two values, plug them into one of the 3 original equations with all three parts and get the third value.

$$\begin{array}{l}
 6. \quad 2x + y = 2 \\
 \quad \quad x + y - z = 4 \\
 \quad \quad 3x + 2y + z = 0
 \end{array}
 \qquad \text{Answer: } (1, 0, -3)$$

$$\begin{array}{l}
 7. \quad x + z = 3 \\
 \quad \quad x + 2y - z = 1 \\
 \quad \quad 2x - y + z = 3
 \end{array}
 \qquad \text{Answer: } (1, 1, 2)$$

$$\begin{array}{l}
 8. \quad x + y = -4 \\
 \quad \quad y - z = 1 \\
 \quad \quad 2x + y + 3z = -21
 \end{array}
 \qquad \text{Answer: } (1, -5, -6)$$