

Solving simultaneous equations is the process of finding var. that satisfy equations.

Problem #1.

$$3x - y = 2$$

$$x = 4$$

Using substitution,

$3(4) - y = 2$, substituting $x=4$ for x .

$$\begin{aligned} 12 - 2 &= y \\ &= 10. \end{aligned}$$

Therefore $x=4$ and $y=10$.

□

Problem #2.

$$3x - 2y = 4$$

$$6x + 3y = 15$$

$$6x - 4y = 8$$

$6x + 3y = 15$, by mult top row by (2).

$0x - 7y = -7$, by subtracting Row2 from Row1.

$$y = 1$$

$$3x - 2y = 4$$

$3x - 2(1) = 4$, by substituting $y=1$.

$$3x = 4 + 2$$

$$x = 2$$

Therefore $x=2$ and $y=1$.

Problem #3.

Elimination can be used even when the coefficients aren't the same; just have to do the work of making them the same.

$$\begin{aligned}3x - 2y &= 4 \\6x + 3y &= 15\end{aligned}$$

$6x - 4y = 8$, by scaling the first equation by factor of 2.

$$6x + 3y = 15$$

$$\begin{array}{r}6x - 4y = 8 \\- 6x + 3y = 15 \\\hline -7y = -7 \\y = 1\end{array}$$

, by elimination

$$3x - 2y = 4$$

$$3x - 2(1) = 4, \text{ by substitution}$$

$$3x = 6$$

$$x = 2$$

Therefore $x = 2$ and $y = 1$.

□

Problem #4.

You can also rearrange a linear equation and substitute it into another to find their intersecting points.

$$-2x + 2y = 20$$

$$5x + 3y = 6$$

$-x + y = 10$, by scaling equation #1 by 2.

$$\underline{5x + 3y = 6}$$

$0x + 8y = 56$, by scaling eq #1 by 5 and then using eq 1 + 2.
 $y = 7$

$$-x + y = 10$$

$-x + 7 = 10$, by sub. $y = 7$.

$$x = -3$$

Therefore $x = -3$ and $y = 7$.

Problem #5

$$3x - 2y + z = 7$$

$$x + y + z = 2$$

$$3x - 2y - z = 3$$

$$\begin{array}{r} x + y + z = 2 \\ \underline{3x - 2y - z = 3} \\ 2z = 4 \end{array} \text{ by eq 1 less eq 3.}$$

$$2z = 4$$

$z = 2$, eq 2 suggests $z = 2$ by rearrange.

Resolve eq #2 and #3,

$$x + y + z = 2$$

$$3x - 2y - z = 3$$

$$x + y = 0$$

$3x - 2y = 5$, by sub $z = 2$.

$$x = -y, \text{ by eq 2.}$$

$$3(-y) - 2y = 5, \text{ by sub } x = -y$$

$$-5y = 5$$

$$y = -1$$

$$x + y + z = 2$$

$$x + (-1) + 2 = 2, \text{ by sub } z=2 \text{ and } y=-1$$

$$x = 1$$

Therefore $x=1, y=-1, z=2.$