

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

Problem #1.

$$3x - y = 2$$

$$x = 4$$

Using substitution,

$$3(4) - y = 2, \text{ substituting } x=4 \text{ for } x.$$

$$12 - 2 = y$$
$$= 10.$$

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

Problem #2.

$$3x - 2y = 4$$

$$6x + 3y = 15$$

$$6x - 4y = 8$$

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

$$0x - 7y = -7, \text{ by subtracting Row2 from row 1.}$$
$$y = 1$$

$$3x - 2y = 4$$

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

$$3x = 4 + 2$$

$$x = 2$$

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.

$$3x - 2y = 4$$

$$6x + 3y = 15$$

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

$$6x + 3y = 15$$

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

$$-7y = -7$$

$$y = 1, \text{ by elimination}$$

$$3x - 2y = 4$$

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

$$3x = 6$$

$$x = 2$$

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.

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

$$6x + 3y = 6$$

$-x + y = 10$, 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

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

$$x + y + z = 2$$

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

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

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

$$2z = 4$$

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

Resolve Eq #2 and #3,

$$x + y + z = 2$$

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

$$x + y = 0$$

$$3x - 2y = 5, \text{ by sub } z = 2.$$

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

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

$$-5y = 5$$

$$y = -1$$

$$x + y + z = 2$$

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

$$x = 1$$

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