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.

$12 - 2 = y$

$= 10.$

Therefor $x = 4$ 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 row 1.

$y = 1$

$3x - 2y = 4$

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

$3x = 4 + 2$

$x = 2$

Therefor $x = 2$ 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.

$$3x - 2y = 4$$
$$6x + 3y = 15$$

$6x - 4y = 8$, by scaling the first equation by factor of 2.
$6x + 3y = 15$

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

$y = 1$, by elimination

$3x - 2y = 4$
$3x - 2(1) = 4$, by substitution
$3x = 6$
$x = 2$

Therefor $x = 2$ 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^{-1}.

$5x + 3y = 6$

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

$y = 7$

$-x + y = 10$

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

$x = -3$

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

Problem #5

$3x - 2y + z = 7$

$x + y + z = 2$

$3x - 2y - z = 3$

$2z = 4$, by eq 1 less eq 3.

$x + y + z = 2$

$3x - 2y - z = 3$

$2z = 4$

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

Resolve Eq #2 and #3,

$x + y + z = 2$

$3x - 2y - z = 3$

$x + y = 0$

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

$x = -y$, by eq 2.

$3(-y) - 2y = 5$, by sub $x = -y$

$-5y = 5$

$y = -1$

$x + y + z = 2$

$x + (-1) + 2 = 2$, by sub $z=2$ and $y=-1$

$x = 1$

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