Answer Key to Practice Test 2 (Solving Systems of Equations by Elimination or Substitution)

1)
$$\begin{array}{r} -x - y = 8 \\ +\ x - 3y = 8 \\ \hline -4y = 16 \end{array}$$

It is easier to answer using ELIMINATION method since variable x of both equations have the same coefficients (regardless of the sign).
Since variable x of both equations have the same coefficients and different signs, we can eliminate it easily using ADDITION.

$$\begin{array}{r} -x - y = 8 \\ +\ x - 3y = 8 \\ \hline -4y = 16 \end{array}$$

Solve for "y" algebraically: y = –4
After solving for the value of "y", solve for the value of "x" by substituting the value of "y" to ANY of the two equations. Using equation 1:

–x –(–4) = 8
–x + 4 = 8
–x = 4
x = –4

After solving for the value of "x" and "y", do the checking on BOTH equations. Simply plug in the values of x and y in both equations:

Equation 1: –(–4) –(–4) = 8
4 + 4 = 8
8 = 8

Equation 2: –4 – 3(–4) = 8
–4 + 12 = 8
8 = 8

Since both checking are correct, you can now write your solution set: S.S. {(–4, –4)}

2)
$$\begin{cases} -2x - 2y = 6 \\ 10x + 10y = -30 \end{cases}$$

You can simplify the equations first before solving:

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

It is easier to answer using ELIMINATION method since variable x (or in this case, even variable y) of both equations have the same coefficients (regardless of the sign).
Since variable x of both equations have the same coefficients and different signs, we can eliminate it easily using ADDITION.

$$\begin{array}{r} -x - y = 3 \\ +\ x + y = -3 \\ \hline 0 = 0 \end{array}$$

S.S. {(x,y)|–x–y=3}

3) $\begin{cases} -x + \frac{2}{5} = -\frac{3}{5}y \\ 3y = -\frac{18}{11}x + \frac{51}{11} \end{cases}$

You can remove all the fractions first on both equations so that it will be easier to manipulate.

$$\begin{cases} -5x + 2 = -3y \\ 33y = -18x + 51 \end{cases}$$

Make sure all the variables are "lined up".

$$\begin{cases} -5x + 3y = -2 \\ 18x + 33y = 51 \end{cases}$$

We cannot eliminate variable y or x yet because their coefficients are different. We need to make their coefficients the same first. It is easier to eliminate variable y, because we only need to manipulate the 1st equation. We need to multiply the first equation by 11 so that the coefficients of y will be both 33 (regardless of the sign).
Note: You can also choose to eliminate variable x but it will take more effort since you need to multiply equation 1 by 18 and multiply equation 2 by 5 so that both variable x will have a coefficient of 90.

$$\begin{cases} -55x + 33y = -22 \\ 18x + 33y = 51 \end{cases}$$

You can eliminate variable y using SUBTRACTION (since variable y has the same coefficients and the same sign as well):

$$\begin{array}{r} -55x + 33y = -22 \\ -\ 18x + 33y = 51 \\ \hline -73x \qquad = -73 \end{array}$$

Solve for the value of x algebraically: x = 1

After solving for the value of "x", solve for the value of "y" by substituting the value of "x" to ANY of the two equations. Using equation 1:
–5(1) + 2 = –3y
–5 + 2 = –3y
–3 = –3y
1 = y

After solving for the value of "x" and "y", do the checking on BOTH equations. Simply plug in the values of x and y in both equations:

Equation 1: $-5(1) + 2 = -3(1)$
$-5 + 2 = -3$
$-3 = -3$

Equation 2: $33(1) = -18(1) + 51$
$33 = -18 + 51$
$33 = 33$

Since both checking are correct, you can now write your solution set: S.S. {(1, 1)}

4) $\begin{cases} 7x + 2y = -6 \\ -14x - 4y = -2 \end{cases}$

You can simplify equation 2 first before solving:

$\begin{cases} 7x + 2y = -6 \\ -7x - 2y = -1 \end{cases}$

It is easier to answer using ELIMINATION method since variable x (or in this case, even variable y) of both equations have the same coefficients (regardless of the sign).
Since variable x of both equations have the same coefficients and different signs we can eliminate it easily using ADDITION.

$$\begin{array}{r} 7x + 2y = -6 \\ +\ \underline{-7x - 2y = -1} \\ 0 = -7 \end{array}$$

S.S. { }

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

Since y is already isolated, we can substitute its value to equation 2 already:
$5x + 4(-5) = -20$
$5x - 20 = -20$
$5x = 0$
$x = 0$

After solving for the value of "x" (you already have the value for "y"), do the checking on equation 2 (no need to check for equation 1 in this case). Simply plug in the values of x and y in equation 2:

Equation 2: $5(0) + 4(-5) = -20$
$0 - 20 = -20$
$-20 = -20$

S.S. {(0, –5)}

6) $\begin{cases} -x + 2y = -7 \\ -2x - 6y = -14 \end{cases}$

You can simplify equation 2 first before solving:

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

It is easier to answer using ELIMINATION method since variable x of both equations have the same coefficients.
Since variable x of both equations have the same coefficients and the same signs, we can eliminate it easily using SUBTRACTION.

$$\begin{array}{r} -x + 2y = -7 \\ -(-x - 3y = -7) \\ \hline 5y = 0 \end{array}$$

Solve for the value of y algebraically: y = 0

After solving for the value of "y", solve for the value of "x" by substituting the value of "y" to ANY of the two equations. Using equation 1:

$-x + 2(0) = -7$
$-x + 0 = -7$
$x = 7$

After solving for the value of "x" and "y", do the checking on BOTH equations. Simply plug in the values of x and y in both equations:

Equation 1: $-7 + 2(0) = -7$
$-7 + 0 = -7$

Equation 2: $-2(7) - 6(0) = -14$
$-14 - 0 = -14$
$-14 = -14$

Since both checking are correct, you can now write your solution set: S.S. {(7, 0)}

7) $\begin{cases} 2x + 18y = 22 \\ -x - 9y = -11 \end{cases}$

You can simplify equation 1 first before solving:

$\begin{cases} x + 9y = 11 \\ -x - 9y = -11 \end{cases}$

It is easier to answer using ELIMINATION method since variable x (or in this case, even variable y) of both equations have the same coefficients (regardless of the sign).
Since variable x of both equations have the same coefficients and different signs, we can eliminate it easily using ADDITION.

$$
\begin{array}{rl}
 & x + 9y = 11 \\
+ & -x - 9y = -11 \\
\hline
 & 0 \;=\; 0
\end{array}
$$

$\{(x,y)|x+9y=11\}$

8) $\begin{cases} x + 7y = 0 \\ 2x - 8y = 22 \end{cases}$

You can simplify equation 2 first before solving:

$\begin{cases} x + 7y = 0 \\ x - 4y = 11 \end{cases}$

Let's try using substitution method here. It is easier to manipulate equation 1 since your constant is 0 (the constant of equation 2 is 11).
It is easier to manipulate equation 1 because its coefficient is 1: $x = -7y$
Since you manipulated equation 1, substitute $-7y$ to x in equation 2: $-7y - 4y = 11$
Solve for y algebraically: $-11y = 11 \rightarrow y = -1$

After solving for the value of "y", solve for the value of "x" by substituting the value of "y" to ANY of the two equations. Using equation 1:

$x + 7(-1) = 0$
$x - 7 = 0$
$x = 7$

After solving for the value of "x" and "y", do the checking on BOTH equations. Simply plug in the values of x and y in both equations:

Equation 1: $7 + 7(-1) = 0$
$7 - 7 = 0$

Equation 2: $2(7) - 8(-1) = 22$
$14 + 8 = 22$
$22 = 22$

Since both checking are correct, you can now write your solution set: S.S. $\{(7, -1)\}$