

Name: \_\_\_\_\_

Date: \_\_\_\_\_

## Substitution Homework

\* Multiple ways to solve.  
\* Alphabetically

Use the substitution method to solve the linear system.

$$1) \begin{cases} x = y + 5 \\ 2x + y = 19 \end{cases}$$

$$x = 3 + 5 \\ x = 8$$

$$2(y + 5) + y = 19$$

$$2y + 10 + y = 19$$

$$3y + 10 = 19$$

$$3y = 9$$

$$y = 3$$

$$(8, 3)$$

$$2) \begin{cases} 2x = 8 \\ x + y = 2 \end{cases}$$

$$x = -y + 2$$

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

$$2(-y + 2) = 8$$

$$-2y + 4 = 8$$

$$-2y = 4$$

$$y = -2$$

$$(4, -2)$$

$$3) \begin{cases} x + y = 4 \\ x + y = 1 \end{cases} \quad y = -x + 4$$

$$x + -x + 4 = 1$$

$$0x + 4 = 1$$

$$4 = 1$$

No Solution

$$4) \begin{cases} 3x - 2y = 19 \\ x + y = 8 \end{cases}$$

$$y = -x + 8$$

$$y = -7 + 8$$

$$3x - 2(-x + 8) = 19$$

$$y = 1$$

$$3x + 2x - 16 = 19$$

$$5x - 16 = 19$$

$$5x = 35$$

$$x = 7$$

$$(7, 1)$$

$$5) \begin{cases} a - b = 0 \\ 7a + b = 0 \end{cases} \quad a = b$$

$$7a + b = 0$$

$$a = 0$$

$$7b + b = 0$$

$$8b = 0$$

$$b = 0$$

$$(0, 0)$$

$$6) \begin{cases} x + 2y = 1 \\ 5x + 3y = -23 \end{cases}$$

$$x = -2y + 1$$

$$x = -2(4) + 1$$

$$x = -8 + 1$$

$$x = -7$$

$$5(-2y + 1) + 3y = -23$$

$$-10y + 5 + 3y = -23$$

$$-7y + 5 = -23$$

$$-7y = -28$$

$$y = 4$$

$$(-7, 4)$$

$$7) \begin{cases} -3w+z=4 \\ -8w+5z=-1 \end{cases} \quad z=3w+4$$

$$\begin{aligned} -8w + 5(3w+4) &= -1 & z &= 3(-3)+4 \\ -8w + 15w + 20 &= -1 & z &= -9+4 \\ 7w + 20 &= -1 & z &= -5 \\ 7w &= -21 \\ w &= -3 \end{aligned}$$

$$\boxed{(-3, -5)}$$

$$9) \begin{cases} x-7y=-1 \\ 8y-x=-3 \end{cases} \quad x=7y-1$$

$$\begin{aligned} 8y - (7y-1) &= -3 & x &= 7(-4)-1 \\ 8y - 7y + 1 &= -3 & x &= -28-1 \\ y + 1 &= -3 & x &= -29 \\ y &= -4 \end{aligned}$$

$$\boxed{(-29, -4)}$$

$$11) \begin{cases} 5x+y=2 \\ 2y+10x=4 \end{cases} \quad y=-5x+2$$

$$\begin{aligned} 2(-5x+2) + 10x &= 4 \\ -10x + 4 + 10x &= 4 \\ 0x + 4 &= 4 \\ 4 &= 4 \end{aligned}$$

$\boxed{\text{Infinite Solutions}}$

$$8) \begin{cases} x-y=6 \\ -2x+2y=4 \end{cases} \quad x=y+6$$

$$\begin{aligned} -2(y+6) + 2y &= 4 \\ -2y - 12 + 2y &= 4 \\ 0y - 12 &= 4 \\ -12 &= 4 \end{aligned}$$

$\boxed{\text{No Solution}}$

$$10) \begin{cases} y=-8x-10 \\ y=-4x-2 \end{cases}$$

$$y = -8(-2) - 10 \quad y = 6$$

$$\begin{aligned} -8x - 10 &= -4x - 2 \\ +8x & \quad +8x \\ \hline -10 &= 4x - 2 \\ -8 &= 4x \\ -2 &= x \end{aligned}$$

$$\boxed{(-2, 6)}$$

$$12) \begin{cases} 4y=4x+8 \\ 4x-3y=-11 \end{cases} \quad y=x+2$$

$$\begin{aligned} y &= -5+2 \\ y &= -3 \end{aligned}$$

$$\begin{aligned} 4x - 3(x+2) &= -11 \\ 4x - 3x - 6 &= -11 \\ x - 6 &= -11 \\ x &= -5 \end{aligned}$$

$$\boxed{(-5, -3)}$$