Notes: 6.1 (continued) Solving Systems by Substitution Name: Key

Solve each system of equations by substitution. Determine whether the system is consistent or inconsistent.

1) Get y by itself

$$\begin{cases} \frac{1}{2}x + \frac{3}{2}y = 4 \\ \frac{2}{3}x - \frac{1}{3}y = 7 \end{cases}$$

$2 \cdot (\frac{1}{2}x + \frac{3}{2}y = 4)$

$1x + 3y = 8$

$-x \quad -x$

$\frac{3y}{3} = \frac{-x}{3} + \frac{8}{3}$

$y = -\frac{1}{3}x + \frac{8}{3}$

$3 \cdot (\frac{2}{3}x - \frac{1}{3}y = 7)$

$2x - 1y = 21$

$-2x \quad -2x$

$\frac{-1y}{-1} = \frac{-2x}{-1} + \frac{21}{-1}$

$y = 2x - 21$

2) set equations equal and solve for x

$3 \cdot (-\frac{1}{3}x + \frac{8}{3} = 2x - 21)$

$-1x + 8 = 6x - 63$

$-6x \quad -6x$

$-7x + 8 = -63$

$-8 \quad -8$

$\frac{-7x}{-7} = \frac{-71}{-7}$

$x = 10.14$

3) Choose equation to plug in x and solve for y

$y = 2x - 21$

$y = 2(10.14) - 21$

$y = 20.28 - 21$

$y = -0.72$

$\boxed{\text{Solution: } (10.14, -0.72)}$

$$\begin{cases} y = 2x - 3 \\ x = 4 \end{cases}$$

Equations are already solved for y, and you already know what x equals, so just plug x = 4 into the first equation to find y

$y = 2x - 3$

$x = 4$

$y = 2(4) - 3$

$y = 8 - 3$

$y = 5$

$\boxed{\text{Solution: } (4, 5)}$

$$\begin{cases} 0.8x - 0.2y = 1.5 \\ 0.1x + 1.2y = 0.8 \end{cases}$$

$10 \cdot (0.1x + 1.2y = 0.8)$

$1x + 12y = 8$

$-x \quad -x$

$\frac{12y}{12} = \frac{-x}{12} + \frac{8}{12}$

$y = -\frac{1}{12}x + \frac{8}{12}$

$10(0.8x - 0.2y = 1.5)$

$8x - 2y = 15$

$-8x \quad -8x$

$\frac{-2y}{-2} = \frac{-8x}{-2} + \frac{15}{-2}$

$y = 4x - \frac{15}{2}$

$12 \cdot (-\frac{1}{12}x + \frac{8}{12} = 4x - \frac{15}{2}) \rightarrow -1x + 8 = 48x - 90$

$-48x \quad -48x$

$-49x + 8 = -90$

$-8 \quad -8$

$\frac{-49x}{-49} = \frac{-98}{-49}$

$x = 2$

$y = 4x - \frac{15}{2}$

$y = 4(2) - \frac{15}{2}$

$y = 8 - \frac{15}{2}$

$y = 0.5$

$\boxed{\text{Solution: } (2, 0.5)}$

$$\begin{cases} 2x + y = 9 \\ y = 5x + 2 \end{cases}$$

$2x + y = 9$

$-2x \quad -2x$

$y = -2x + 9$

set equations equal to solve for x

$-2x + 9 = 5x + 2$

$-5x \quad -5x$

$-7x + 9 = 2$

$-9 \quad -9$

$\frac{-7x}{-7} = \frac{-7}{-7}$

$x = 1$

once you have x, plug into one of the equations to solve for y

$y = -2x + 9$

$x = 1$

$y = -2(1) + 9$

$y = -2 + 9$

$y = 7$

Now, write the solution as an ordered pair

$\boxed{\text{Solution: } (1, 7)}$