Hw Section 6.1 Solving Systems of Equations

Solve each system of equations by substitution or elimination. If the system does not have exactly one solution, state whether it has no solution or infinitely many solutions.

#1) (A) $x = 3$
(B) $2y + x = 3$

↓

step 1 (B) $2y + (3) = 3$
$2y + 3 = 3$
$2y = 0$
$y = 0$

$\therefore (3,0)$

#2) (A) $y = 2$
(B) $2x - 4y = 1$

↓

step 1 (B) $2x - 4(2) = 1$
$2x - 8 = 1$
$2x = 9$
$x = 9/2$

$\therefore (9/2, 2)$

#3) (A) $y = 2x - 7$
(B) $3x - y = 7$

↓

step 1 (B) $3x - (2x - 7) = 7$
$3x - 2x + 7 = 7$
$x + 7 = 7$
$x = 0$

step 2 (A) $y = 2(0) - 7$
$= 0 - 7$
$y = -7$

$\therefore (0, -7)$

#4) (A) $-4x - 2y = -12$ $\xrightarrow{A}$
(B) $4x + 8y = -24$ $\xrightarrow{B}$

step 1

$-4x - 2y = -12$
$+ \quad 4x + 8y = -24$
$6y = -36$
$y = -6$

step 2 (B) $4x + 8(-6) = -24$
$4x - 48 = -24$
$4x = 24$
$x = 6$

$\therefore (6, -6)$

#5) (A) $-2x - 9y = -25$ $\xrightarrow{A}$
(B) $-4x - 9y = -23$ $\xrightarrow{-B}$

step 1

$-2x - 9y = -25$
$+ \quad 4x + 9y = 23$
$2x = -2$
$x = -1$

step 2 (A) $-2(-1) - 9y = -25$
$2 - 9y = -25$
$-9y = -27$
$y = 3$

$\therefore (-1, 3)$

#6) (A) $x = 2y$
(B) $.25x + .5y = 10$ $\xrightarrow{100B}$ $25x + 50y = 1000$

↓

step 1 (B) $25(2y) + 50y = 1000$
$50y + 50y = 1000$
$100y = 1000$
$y = 10$

step 2 (A) $x = 2(10)$
$x = 20$

$\therefore (20, 10)$

#7) (A) $3x + 2y = 0$ ⟹ (A) $\times$ 1
(B) $x - 5y = 17$ ⟹ (B) $\times$ −3

Step 1

$$\begin{array}{rl} & 3x + 2y = 0 \\ + & -3x + 15y = -51 \\ \hline & 17y = -51 \end{array}$$

$y = -3$

Step 2 (B) $x - 5(-3) = 17$
$x + 15 = 17$
$x = 2$
$\therefore (2, -3)$

#8) (A) $2x + 3y = 6$ ⟹ (A) $\times$ 1
(B) $x + 2y = 5$ ⟹ (B) $\times$ −2

Step 1

$$\begin{array}{rl} & 2x + 3y = 6 \\ + & -2x - 4y = -10 \\ \hline & -y = -4 \end{array}$$

$y = 4$

Step 2 (B) $x + 2(4) = 5$
$x + 8 = 5$
$x = -3$
$\therefore (-3, 4)$

#9) (A) $3x - y = 2$ ⟹ (A) $\times$ 2
(B) $x + 2y = 3$ ⟹ (B) $\times$ 1

Step 1

$$\begin{array}{rl} & 6x - 2y = 4 \\ + & x + 2y = 3 \\ \hline & 7x = 7 \end{array}$$

$x = 1$

Step 2 (B) $(1) + 2y = 3$
$2y = 2$
$y = 1$
$\therefore (1, 1)$

#10) (A) $4x + 5y = 6$ ⟹ (A) $\times$ 3
(B) $6x - 7y = -20$ ⟹ (B) $\times$ −2

Step 1

$$\begin{array}{rl} & 12x + 15y = 18 \\ + & -12x + 14y = 40 \\ \hline & 29y = 58 \end{array}$$

$y = 2$

Step 2 (A) $4x + 5(2) = 6$
$4x + 10 = 6$
$4x = -4$
$x = -1$
$\therefore (-1, 2)$

#11) (A) $y = 4x$
(B) $x + y = 5$

Step 1 (B) $x + (4x) = 5$
$5x = 5$
$x = 1$

Step 2 (A) $y = 4(1)$
$y = 4$
$\therefore (1, 4)$

#12) (A) $x = -4y$
(B) $3x + 2y = 20$

Step 1 (B) $3(-4y) + 2y = 20$
$-12y + 2y = 20$
$-10y = 20$
$y = -2$

Step 2 (A) $x = -4(-2)$
$x = 8$
$\therefore (8, -2)$

#13) (A) $y = x - 1$
(B) $x + y = 3$

↓

Step 1 (B) $x + (x-1) = 3$
$2x - 1 = 3$
$2x = 4$
$x = 2$

Step 2 (A) $y = (2) - 1$
$y = 1$
$\therefore (2,1)$

#14) (A) $3x - y = 4$ $\xrightarrow{-3A}$ $-9x + 3y = -12$
(B) $2x - 3y = -9$ $\Rightarrow$ $+\ 2x - 3y = -9$

Step 1 $-7x = -21$
$x = 3$

Step 2 (A) $3(3) - y = 4$
$9 - y = 4$
$-y = -5$
$y = 5$
$\therefore (3,5)$

#15) (A) $x + 5y = 4$ $\xrightarrow{-3A}$ $-3x - 15y = -12$
(B) $3x + 15y = -1$ $\Rightarrow$ $+\ 3x + 15y = -1$

Step 1 $0 = -13$
$\therefore$ no solution

#16) (A) $x - 5y = 10$ $\xrightarrow{-2A}$ $-2x + 10y = -20$
(B) $2x - 10y = 20$ $\Rightarrow$ $+\ 2x - 10y = 20$

Step 1 $0 = 0$
$\therefore$ infinitely many solutions

#17) (A) $x + 4y = 8$ $\xrightarrow{-2A}$ $-2x - 8y = -16$
(B) $2x - 5y = 29$ $\Rightarrow$ $+\ 2x - 5y = 29$

Step 1 $-13y = 13$
$y = -1$

Step 2 (A) $x + 4(-1) = 8$
$x - 4 = 8$
$x = 12$
$\therefore (12,-1)$

#18) (A) $4x + y = 0$ $\xrightarrow{-2A}$ $-8x - 2y = 0$
(B) $x + 2y = -7$ $\Rightarrow$ $+\ x + 2y = -7$

Step 1 $-7x = -7$
$x = 1$

Step 2 (A) $4(1) + y = 0$
$4 + y = 0$
$y = -4$
$\therefore (1,-4)$

#19) (A) $2x - 3y = -24$ $\xrightarrow{2A}$
(B) $x + 6y = 18$ $\xrightarrow{B}$

Step 1

$$\begin{array}{rrr} & 4x & -6y = -48 \\ + & x & +6y = 18 \\ \hline & 5x & = -30 \end{array}$$

$x = -6$

Step 2 (B) $(-6) + 6y = 18$

$6y = 24$

$y = 4$

$\therefore (-6, 4)$

#20) (A) $x + 14y = 84$ $\xrightarrow{A}$
(B) $2x - 7y = -7$ $\xrightarrow{2B}$

Step 1

$$\begin{array}{rrr} & x & +14y = 84 \\ + & 4x & -14y = -14 \\ \hline & 5x & = 70 \end{array}$$

$x = 14$

Step 2 (A) $(14) + 14y = 84$

$14y = 70$

$y = 5$

$\therefore (14, 5)$

Answers

#1) (3, 0)
#2) $\left(\frac{9}{2}, 2\right)$
#3) (0 , -7)
#4) (6, - 6)
#5) (- 1,3)
#6) (20, 10)
#7) (2, -3)

#8) (-3, 4)
#9) (1, 1)
#10) (-1, 2)

#11) (1 ,4)
#12) (8, -2)
#13) (2, 1)
#14) (3, 5)

#15) no solution
#16) infinitely many solutions.
#17) (12, -1)

#18) (1, -4)
#19) (-6, 4)
#20) (14, 5)