

[4.2A] Solving Linear Systems by Substitution

① $y = -2x + 9$
 $x + 4y = 1$

Solve for x

$$x + 4(-2x + 9) = 1$$

$$x - 8x + 36 = 1$$

$$-7x = -35$$

$$x = 5$$

Sub. $x=5$ back into one of the equations

$$y = -2(5) + 9$$

$$y = -10 + 9$$

$$y = -1$$

$(5, -1)$

② $x = 2y + y \rightarrow x = 3y$
 $2x - 5y = 4$
 $2(3y) - 5y = 4$
 $6y - 5y = 4$
 $y = 4$

$$x = 3(4)$$

$$x = 12$$

$(12, 4)$

③ $y - 2x = -17$
 $x + y = 16$
 $x = 16 - y$
 $x = 16 - 5$
 $x = 11$

First, isolate a variable

$$y + 2(16 - y) = -17$$

$$y + 32 - 2y = -17$$

$$3y - 32 = -17 + 32$$

$$3y = 15$$

$$y = 5$$

$(11, 5)$

* ④ $3x - 2y = 5$
 $x + y = 15$
 $x = 15 - y$

1st: Isolate a variable

2nd: Sub. the expression into the other equation

3rd: Solve

$$3(15 - y) + 2y = 5$$

$$45 + 3y + 2y = 5$$

$$-5y = -40$$

$$y = 8$$

4th: Sub. answer back into one of the equations.

$$x = 15 - 8$$

$$x = 7$$

$(7, 8)$

⑤

$$y = 5x - 3$$

$$y = -2x + 4$$

$$5x - 3 = -2x + 4$$

$$7x - 3 = 4$$

$$7x = 7$$

$$x = 1$$

$$y = 5(1) - 3$$

$$y = 5 - 3$$

$$y = 2$$

$$(1, 2)$$

Solve each system of equations by the substitution method.

1. $y = 3x$
 $5x + 2y = 44$

2. $x = 5y - 1$
 $x + 2y = 13$

3. $y = 2x + 7$
 $3x - y = -9$

4. $-2x + 3y = 11$
 $x = 4y - 3$

5. $y = 6x - 5$
 $y = -x + 9$

6. $-3x + y = 7$
 $5x + 2y = 3$

7. $x - y = 11$
 $3x + 10y = -6$

8. $-4x + y = 4$
 $2x + 2y = 13$

9. $x + y = 1$
 $5x - 4y = -7$

10. $-5x + 3y = 11$
 $x - 2y = 2$

11. $x + 9y = -1$
 $2x + 4y = 5$

12. $-5x + y = 35$
 $3x + 2y = -21$