

Elimination Notes

Elimination Method: Part 1

- Line up the two equations in Standard Form. $Ax + By = C$
- Choose either the x's or y's to cancel – you want the coefficients (the number out front) to be the same
- Eliminate the variable by adding or subtracting the equations
 - Add if the signs are opposite
 - Subtract if the signs are the same
- Solve for the one remaining variable
- Substitute any back in ~~the~~ equation to solve for the other variable
- Express your answer as a point (X, Y)

Example 1:

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

$$\begin{array}{r}
 4x = 12 \\
 \hline
 4 \quad 4 \\
 \hline
 \end{array}$$

$$x = 3$$

- Eliminate y
- Opposite signs $\rightarrow$ Add

$$\begin{array}{r}
 x - 2y = 7 \\
 3 - 2y = 7 \\
 \hline
 -2y = 4 \\
 \hline
 -2 \quad -2 \\
 \hline
 y = -2
 \end{array}$$

$$(3, -2)$$

Example 2:

$$6x + y = 14 \quad (1)$$

$$+ \quad 10x - y = 2 \quad (2)$$

$$16x = 16$$

$$x = 1$$

$$6x + y = 14$$

$$6(1) + y = 14$$

$$y = 8$$

$$(1, 8)$$

Practice 1:

$$x + 2y = 2$$

$$- \quad x - 4y = 14$$

$$6y = -12$$

$$6 \quad \quad 6$$

$$y = -2$$

$$(6, -2)$$

$$x + 2y = 2$$

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

$$x - 4 = 2$$

$$x = 6$$

Elimination Part 2: Make the coefficients be the same through multiplication.

Practice 1:

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

Step 1: Put the equations in Standard Form



Step 2: Determine which variable to eliminate. Is it easier to make 2 become $3 \frac{x}{3}$ or 1 become $2 \textcircled{x} y$

multiply $\textcircled{2}$ by 2

Step 3: Multiply the ENTIRE EQUATION and then add/subtract. Solve.

$$\begin{array}{rcl} 2x + 2y = 6 & \} & \rightarrow 2x + \cancel{2y} = 6 \\ 3x - y = 5 & \} \times 2 & \rightarrow 6x - \cancel{2y} = 10 \end{array} +$$

$$\begin{array}{r} 8x = 16 \\ \hline x = 2 \end{array}$$

Step 4: Plug back in to find the other variable.

$$2x + 2y = 6$$

$$2(2) + 2y = 6$$

$$4 + 2y = 6$$

$$\frac{2y}{2} = \frac{2}{2}$$

$$y = 1$$

Solution:

$$(2, 1)$$

Practice 2:

$$\begin{cases} x = -4y + 7 & \textcircled{1} \\ 4x - 3y = 9 & \textcircled{2} \end{cases}$$

Step 1: Put the equations in Standard Form

$$\begin{array}{l} \textcircled{1} \quad (x + 4y = 7) \\ \textcircled{2} \quad 4x - 3y = 9 \end{array} \left. \begin{array}{l} \times 4 \rightarrow \\ \rightarrow - \end{array} \right\} \begin{array}{l} 4x + 16y = 28 \\ 4x - 3y = 9 \end{array}$$

Step 2: Determine which variable to eliminate. Is it easier to make 2 become 3 (y) or 1 become 2 (x).

$$\begin{array}{r} 19y = 19 \\ \hline 19 \end{array} \quad \begin{array}{r} 19 \\ \hline 19 \end{array}$$

Step 3: Multiply the ENTIRE EQUATION and then add/subtract. Solve.

$$x = -4y + 7$$

$$x = -4(1) + 7$$

$$x = 3$$

$$y = 1$$

Step 4: Plug back in to find the other variable.

$$(3, 1)$$

Solution:

Practice 3:

$$\begin{cases} (4x + 7y = -80) \times 3 \\ (3x + 5y = -58) \times 4 \end{cases}$$

$$\begin{array}{r} 12x + 21y = -240 \\ - 12x + 20y = -232 \\ \hline \end{array}$$

$$y = -8$$

$$y = -8$$

$$4x + 7(-8) = -80$$

$$4x - 56 = -80$$

$$\frac{4x}{4} = \frac{-24}{4}$$

$$x = -6$$

$$(-6, -8)$$

Practice 4:

$$\left(\begin{cases} \frac{1}{4}x + 4y = \frac{11}{4} \\ 3x + \frac{1}{2}y = \frac{37}{4} \end{cases} \right) \times 4$$

$$\left(\begin{array}{l} x + 16y = 11 \\ 12x + 2y = 37 \end{array} \right) \times 12$$

$$\begin{array}{r} 12x + 192y = 132 \\ - 12x + 2y = 37 \\ \hline 196y = 95 \\ y = \frac{1}{2} \end{array}$$

$$(3, \frac{1}{2})$$

$$\left. \begin{array}{l} x + 16y = 11 \\ 96x + 16y = 296 \end{array} \right\}$$

Elimination HW

1.
$$\begin{aligned} 2x - 3y &= -4 \\ 2x + y &= 4 \end{aligned}$$

2.
$$\begin{aligned} 5x - 6y &= -32 \\ 3x + 6y &= 48 \end{aligned}$$

$$\begin{array}{l} 6x + 3y = 24 \\ 3. \quad \underline{4x + 3y = 18} \end{array}$$

$$\begin{array}{l} 4. \quad . \\ 2x - 3y = 12 \\ 4x + 3y = 42. \end{array}$$

5. .

$$-2x + 6y = -26$$

$$8x + 6y = -16.$$

$$-2x + 4y = 10$$

6. $-2x + y = 1.$

$$\begin{array}{l} 3x = 5y + 2 \\ 7. \quad y = 3x - 10. \end{array}$$

PART 2:

$$\text{HW 1: } \begin{cases} 5x + y = 9 \\ 10x - 7y = -18 \end{cases}$$

HW 2: $\begin{cases} 2x + 10y = 2 \\ 3x - 5y = -17 \end{cases}$

HW 3: $\begin{cases} 6x + 5y = 7 \\ 2x - 4y = -26 \end{cases}$

HW4: $\begin{cases} 4x + 2y = 8 \\ 3x + 3y = 9 \end{cases}$

HW5: $\begin{cases} 8x + 3y = -7 \\ 7x + 2y = -3 \end{cases}$