

**AP Precalculus****Prerequisites Review #8 – Solving Systems of Equations in 2 and 3 Variables**

1. Solve $\begin{cases} x + 2y = 10 \\ y = 2x - 5 \end{cases}$

Solve
Using
Substitution

$$x + 2(2x - 5) = 10$$

$$x + 4x - 10 = 10$$

$$5x - 10 = 10$$

$$5x = 20$$

$$x = 4$$

$$y = 2(4) - 5$$

$$y = 8 - 5$$

$$y = 3$$

solution: $(4, 3)$

2. Solve $\begin{cases} 5x + 7y = 6 \\ 10x - 3y = 46 \end{cases}$

Solve
using
elimination

$$-2(5x + 7y = 6) \rightarrow -10x - 14y = -12$$

$$10x - 3y = 46 \rightarrow 10x - 3y = 46$$

$$-17y = 34$$

$$y = -2$$

$$5x + 7(-2) = 6$$

$$5x - 14 = 6$$

$$5x = 20$$

$$x = 4$$

solution: $(4, -2)$

3.

$$\text{Solve } \begin{cases} 3x + y - 2z = -12 & \textcircled{1} \\ 2x + 2y - 3z = -12 & \textcircled{2} \\ 5x + 3y + 2z = 4 & \textcircled{3} \end{cases}$$

Pair ① and ③ to eliminate z .

$$3x + y - 2z = -12$$

$$5x + 3y + 2z = 4$$

$$8x + 4y = -8$$

Pair ① and ② to eliminate z .

$$3(3x + y - 2z = -12)$$

$$-2(2x + 2y - 3z = -12)$$

$$9x + 3y - 6z = -36$$

$$-4x - 4y + 6z = 24$$

$$5x - y = -12$$

Pair the two smaller equations to eliminate y , solve for x .

$$8x + 4y = -8 \rightarrow 8x + 4y = -8$$

$$4(5x - y = -12) \rightarrow 20x - 4y = -48$$

$$28x = -56$$

$$x = -2$$

Substitute solution for x into one of the smaller equations, solve for y .

$$8(-2) + 4y = -8$$

$$-16 + 4y = -8$$

$$4y = 8$$

$$y = 2$$

$$5(-2) - y = -12$$

$$-10 - y = -12$$

$$-y = -2$$

$$y = 2$$

Substitute x and y into one of the original equations, solve for z .

$$3x + y - 2z = -12$$

$$3(-2) + 2 - 2z = -12$$

$$-6 + 2 - 2z = -12$$

$$-4 - 2z = -12$$

$$-2z = -8$$

$$z = 4$$

$$2x + 2y - 3z = -12$$

$$2(-2) + 2(2) - 3z = -12$$

$$-4 + 4 - 3z = -12$$

$$-3z = -12$$

$$z = 4$$

$$5x + 3y + 2z = 4$$

$$5(-2) + 3(2) + 2z = 4$$

$$-10 + 6 + 2z = 4$$

$$-4 + 2z = 4$$

$$2z = 8$$

$$z = 4$$

Write answer as an ordered triple $(x, y, z) = (-2, 2, 4)$

4. Solve $\begin{cases} y = x^2 + 4x - 2 \\ y = 3x + 5 \end{cases}$

Use substitution to write an equation with one variable.

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

$$0 = x^2 + x - 7 \quad (\text{standard form})$$

$$a = 1 \quad b = 1 \quad c = -7$$

$$x = \frac{-1 \pm \sqrt{(1)^2 - 4(1)(-7)}}{2(1)}$$

$$x = \frac{-1 \pm \sqrt{1+28}}{2}$$

$$x = \frac{-1 \pm \sqrt{29}}{2}$$

$$x = \frac{4.39}{2} \quad \text{or} \quad \frac{-6.39}{2}$$

$$x = 2.195 \quad \text{or} \quad -3.195$$

Substitute x in an original equation to find y .

$$y = 3(2.195) + 5 = 6.585 + 5 = 11.585$$

$$y = 3(-3.195) + 5 = -9.585 + 5 = -4.585$$

Write solutions as ordered pairs to show points of intersection.

$$(2.195, 11.585) \quad \text{and} \quad (-3.195, -4.585)$$