

1. Solve the system of equations:

$$\begin{cases} 2x - y = 3 \\ 6x + 3y = -3 \end{cases} \begin{array}{l} \xrightarrow{\times 3} \\ \implies \end{array} \begin{cases} 6x - 3y = 9 \\ 6x + 3y = -3 \end{cases}$$

$$12x = 6$$

$$x = \frac{1}{2}$$

$$2\left(\frac{1}{2}\right) - y = 3$$

$$1 - y = 3$$

$$y = -2$$

The solution is  $\left(\frac{1}{2}, -2\right)$ .

2. Solve the equation:

$$3x^2 + 2x - 1 = 0$$

$$(3x - 1)(x + 1) = 0$$

$$3x - 1 = 0 \text{ OR } x + 1 = 0$$

$$x = \frac{1}{3} \text{ OR } x = -1$$

3. Solve the equation:

$$x^2 + x + 1 = 0$$

The quadratic formula gives  $x = \frac{-1 + \sqrt{1^2 - 4(1)(1)}}{2(1)}$  OR  $x = \frac{-1 - \sqrt{1 - 4(1)(1)}}{2(1)}$ ,

which simplifies to  $x = \frac{-1 + \sqrt{-3}}{2}$  OR  $x = \frac{-1 - \sqrt{-3}}{2}$ .

But, since  $\sqrt{-3}$  is not allowed, there are no real solutions.

4. Solve the equation:

$$16x - \frac{1}{x} = 0$$

$$x \cdot \left(16x - \frac{1}{x}\right) = x \cdot 0$$

$$16x^2 - 1 = 0$$

$$(4x + 1)(4x - 1) = 0$$

$$4x + 1 = 0 \text{ OR } 4x - 1 = 0$$

$$x = \frac{-1}{4} \text{ OR } x = \frac{1}{4}$$

Extra Credit: Solve the system of equations:

$$\begin{cases} x^2 + y = -2 \\ 2x - y = 1 \end{cases}$$

$$x^2 + 2x = -1$$

$$x^2 + 2x + 1 = 0$$

$$(x + 1)(x + 1) = 0$$

$$x + 1 = 0$$

$$x = -1$$

$$(-1)^2 + y = -2$$

$$1 + y = -2$$

$$y = -3$$

The solution is  $(-1, -3)$ .