

1. Check for symmetry with respect to both axes and the origin:  $x^2y^3 - x^4 = 5$ .

**Answer:** the graph is symmetric about the y axis.

2. Find the standard form of the equation of the circle with center at the point  $(-1, 2)$  and radius 3.

**Answer:**  $(x + 1)^2 + (y - 2)^2 = 9$

3. Solve each equation, if possible:

a.  $2(x + 5) = 6$

Solution is :  $\{x = -2\}$

b.  $4x + 2(7 - x) = 5$

Solution is :  $\{x = -\frac{9}{2}\}$

c.  $\frac{1}{x-2} + \frac{3}{x+3} = \frac{4}{x^2+x-6}$

Solution is :  $x = \frac{7}{4}$

4. Solve by factoring:  $2x^2 - 5x = 12$ .

$$2x^2 - 5x - 12 = 0$$

$$(2x + 3)(x - 4) = 0$$

$$x = -\frac{3}{2} \text{ or } x = 4$$

5. Solve by completing the square:  $x^2 + 2x - 15 = 0$ .

$$x^2 + 2x + 1 = 15 + 1$$

$$(x + 1)^2 = 16$$

$$x + 1 = \pm 4$$

$$x = -5 \text{ or } x = 3$$

6. Solve using the quadratic formula:  $9x^2 + 3x - 2 = 0$

Solution is :  $x = -\frac{2}{3}$  or  $x = \frac{1}{3}$

7. Calculate the discriminant for the quadratic equation  $4x^2 - 98x + \frac{2401}{4} = 0$ . How many solutions does the equation have? (You do NOT have to find them).

The discriminant is  $b^2 - 4ac = (-98)^2 - 4(4)(\frac{2401}{4}) = 0$ , so there is one solution to the equation.

8. Solve each equation (be sure to find ALL solutions):

a.  $x^4 + 5x^2 - 36 = 0$

Solutions :  $x = 2, x = -2$

b.  $(x - 1)^{2/3} - 25 = 0$

Solutions :  $x = -124, x = 126$

c.  $\sqrt{3x - 2} + x = 4$

Solution is :  $x = 2$

d.  $|2x - 3| = 7$

Solution is :  $\{x = 5\}, \{x = -2\}$

e.  $\frac{2}{x} = \frac{3}{x-2} - 1$

Solutions :  $x = -1, x = 4$

9. Solve the system of equations: 
$$\begin{aligned} x^2 - y^2 &= 9 \\ x - y &= 1 \end{aligned}$$

From the second equation,  $x = y + 1$ . Plug this into the first equation:

$$\begin{aligned} (y + 1)^2 - y^2 &= 9, \Rightarrow y = 4 \\ \Rightarrow x &= 4 + 1 = 5. \end{aligned}$$

10. Solve each of the following inequalities:

a.  $\frac{1}{2}(3 - x) < \frac{1}{3}(2 - 3x)$

Solution is :  $\{x < -\frac{5}{3}\}$

b.  $-3 \leq 6x + 1 < 3$

$$-3 \leq 6x + 1 \quad \text{and} \quad 6x + 1 < 3$$

$$\begin{aligned} -\frac{2}{3} &\leq x \quad \text{and} \quad x < \frac{1}{3} \\ -\frac{2}{3} &\leq x < \frac{1}{3} \end{aligned}$$

c.  $|x - 3| < 2$

Solution is :  $1 < x < 5$

d.  $|x + 5| \geq 4$

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Solution is :  $-1 \leq x$  or  $x \leq -9$

e.  $(3x + 1)(2x - 5) > 0$

Solution is :  $x < -\frac{1}{3}$  or  $\frac{5}{2} < x$