

Solving a Radical Inequality

1. $3\sqrt{x-1} \leq 12$

$$\sqrt{x-1} \leq 4$$

Divide each side by 3

$$x-1 \leq 16$$

Square each side

$$x \leq 17$$

Add 1 to each side

$$x-1 \geq 0$$

The Radicand cannot be negative in an even root

$$x \geq 1$$

Add 1 to each side

$$\boxed{1 \leq x \leq 17}$$

Satisfy both conditions at the same time

2. $3\sqrt{x} - 4 \leq 8$

$$3\sqrt{x} \leq 12$$

Add 4 to each side

$$\sqrt{x} \leq 4$$

Divide each side by 3

$$x \leq 16$$

Square each side

$$x \leq 0$$

The Radicand cannot be negative in an even root

$$\boxed{0 \leq x \leq 16}$$

Satisfy both conditions at the same time

Solve the system of equations.

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

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

Since each side is y they must be equal

$$3x^2 - 2x - 8 = 0$$

Arrange the quadratic polynomial = 0

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

Factor

$$x = -4/3 \text{ \& } x = 2$$

Solve

$$\boxed{\left(-\frac{4}{3}, \frac{1}{3}\right) \text{ \& } (2, 7)}$$

Plug in the x-values into the equations

4.
$$\begin{cases} x^2 + y^2 = 26 \\ x - y = 6 \end{cases}$$

$$x = y + 6$$

Solve for x in the 2nd equation

$$(y + 6)^2 + y^2 = 26$$

Substitute $y + 6$ in for x in the 1st equation

$$y^2 + 12y + 36 + y^2 = 26$$

Expand the binomial square

$$2y^2 + 12y + 10 = 0$$

Arrange the quadratic polynomial = 0

$$2(y^2 + 6y + 5) = 0$$

Factor out the 2

$$y^2 + 6y + 5 = 0$$

Divide each side by 2

$$(y + 5)(y + 1) = 0$$

Factor

$$y = -5 \text{ \& } y = -1$$

Solve

$$\boxed{(1, -5) \text{ \& } (5, -1)}$$

Plug in the y -values into the above equations

#'s 1-8: Solve the inequalities for x.

1. $2\sqrt[3]{x} - 5 \geq 3$

2. $\sqrt[3]{x-4} \leq 5$

3. $4\sqrt{x-2} > 20$

4. $7\sqrt{x} + 1 < 9$

5. $2\sqrt{x} + 3 \leq 8$

6. $\sqrt[3]{x+7} \geq 3$

7. $-2\sqrt[3]{x+4} < 12$

8. $-0.25\sqrt{x} - 6 \leq -3$

#'s 9-14: Solve the system of equations.

$$9. \begin{cases} y^2 = x - 3 \\ y = x - 3 \end{cases}$$

$$10. \begin{cases} y^2 = 4x + 17 \\ y = x + 5 \end{cases}$$

$$11. \begin{cases} x^2 + y^2 = 4 \\ y = x - 2 \end{cases}$$

$$12. \begin{cases} x^2 + y^2 = 25 \\ y = -\frac{3}{4}x + \frac{25}{4} \end{cases}$$

$$13. \begin{cases} x^2 + y^2 = 1 \\ y = \frac{1}{2}x^2 - 1 \end{cases}$$

$$14. \begin{cases} x^2 + y^2 = 4 \\ y^2 = x + 2 \end{cases}$$