

8-8 Solving Radical Equations

Objective:

- Solve radical equations

Radical equation - contains a variable within a radical.

Remember:

Steps to solve radical equations:

1. **ISOLATE** the radical.
2. Eliminate the radical by raising both sides of the equation to the appropriate power.
3. Solve the equation.
4. Check for extraneous roots.

Limit the Domain

$$D_{f(x)} : \{x | x \geq 0\}$$

Solve each equation.

Ex 1: $(\sqrt{2x-1})^2 = (\sqrt{x+4})^2$

$$\begin{array}{r} 2x - 1 = x + 4 \\ -x \quad +1 \quad -x \quad +1 \\ \hline x = 5 \end{array}$$

$$3 = 3$$

Ex 2: $13 + \sqrt{5n} = 3$

$$\begin{array}{r} 13 + 10^3 = 3 \\ -13 \quad -13 \\ \hline (\sqrt{5n})^2 = (-10)^2 \\ 5n = 100 \\ n = 20 \\ \text{extraneous} \\ \text{no solution} \end{array}$$

$$\text{Ex 6: } 3(x+6)^{\frac{1}{2}} = 9$$

$$\frac{3\sqrt{x+6}}{3} = \frac{9}{3}$$

$$\sqrt{x+6} = 3$$

$$x+6 = 9$$

$$x = 3$$

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

$$(x+2)^{\frac{1}{3}} = \sqrt[3]{x+2}$$

$(x+12)^{\frac{1}{4}}$ means $\sqrt[4]{x+12}$

$$\text{Ex 3: } (x+5)^{\frac{1}{3}} = 3$$

$$\sqrt[3]{x+5} = 3$$

$$x+5 = 27$$

$$x = 22$$

$$\text{Ex 4: } (\sqrt{x-12}) = (2-\sqrt{x})^2$$

$$x-12 = (2-\sqrt{x})(2-\sqrt{x})$$

$$\cancel{x} - 12 = \cancel{4} - 2\sqrt{x} - 2\sqrt{x} + \cancel{x}$$

$$-16 = -4\sqrt{x}$$

$$4 = \sqrt{x}$$

$$\cancel{4} = x$$

$$2 = 2-4$$

no solution