




PRE-CALC & TRIG

Day 67



From Last Time

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60, 61, 89

6.5 Solving Square Root and Other Radical Equations

Objective: To solve square root and other radical equations

Radical Equation: an equation that contains radicals $\sqrt{\quad}$ or rational exponents

Solving Radical Equations: (with one radical)

You need to eliminate the radicals or rational exponents and obtain a polynomial equation

1. Isolate the radical on one side of the equation
2. Raise each side of the equation to the same power
(use inverse of exponent to eliminate radical)
3. Solve and simplify the equation
4. Check solutions in original equation
(not all solutions will be valid)

Example: Solve $\sqrt[3]{x} - 4 = 0$

$$\sqrt[3]{x} = 4$$

Isolate Radical

$$\left(\sqrt[3]{x}\right)^3 = 4^3$$

Raise each side to same power

$$x = 64$$

Solve and Simplify

Check: $\sqrt[3]{64} - 4 = 4 - 4 = 0$

Solving Radical Equations: (with two radicals)

You need to eliminate the radicals or rational exponents and obtain a polynomial equation

1. Rewrite the equation so that each side has only one radical expression
2. Raise each side of the equation to the same power
(use inverse of exponent to eliminate radical)
3. Solve and simplify the equation
4. Check solutions in original equation
(not all solutions will be valid)

Example: Solve $\sqrt{3x+2} - 2\sqrt{x} = 0$

$$\sqrt{3x+2} = 2\sqrt{x}$$

Get one radical on each side

$$\left(\sqrt{3x+2}\right)^2 = \left(2\sqrt{x}\right)^2$$

Raise each side to same power

$$3x + 2 = 4x$$

Simplify

$$2 = x$$

Solve

Check: $\sqrt{3 \cdot 2 + 2} - 2\sqrt{2} = \sqrt{8} - 2\sqrt{2} = 2\sqrt{2} - 2\sqrt{2} = 0$

Examples:

1.) $5x^3 + 2 = 42$

2.) $\sqrt{4x - 7} + 2 = 5$

3.) $\sqrt[3]{x + 4} - \sqrt[3]{2x - 5} = 0$

4.) $5x^{2/3} - 12 = 8$

Solutions

$$1.) 5x^3 = 40 \rightarrow x^3 = 8 \rightarrow \mathbf{x = 2}$$

$$2.) \sqrt{4x - 7} = 3 \rightarrow 4x - 7 = 9 \rightarrow 4x = 16 \rightarrow x = 4$$

$$3.) x + 4 = 2x - 5 \rightarrow \mathbf{x = 9}$$

$$4.) x^{2/3} = 4 \rightarrow x = 4^{3/2} \rightarrow x = 2^3 \rightarrow \mathbf{x = 8}$$

More Examples (if needed)

$$\sqrt[4]{6x - 5} = \sqrt[4]{x + 10}$$

$$-\sqrt{8x + \frac{4}{3}} = \sqrt{2x + \frac{1}{3}}$$

$$4x^{3/4} = 108$$

$$x - 4 = \sqrt{2x}$$

For Next Time

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