

1.5 Solving Equations

Objectives: Solve linear equations, radical equations, rational equations, quadratic equations.

Linear Equations

Example 1 Solve the linear equation: $\sqrt{3}x + \sqrt{12} = \frac{x+3}{\sqrt{3}}$

Example 2 Solve the quadratic equation by completing the square: $x^2 - 8x - 5 = 0$

The Quadratic Formula

The roots of the quadratic equation $ax^2 + bx + c = 0$ where $a \neq 0$, is

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

The **discriminant** is $b^2 - 4ac$ and determines the nature of the roots. Let $D = b^2 - 4ac$.

1. If $D > 0$ there are two real roots.
2. If $D = 0$ there is one real root.
3. If $D < 0$ there are two complex roots.

Example 3 Solve the quadratic equation: $3x^2 + 6x - 2 = 0$.

Rational Equations

Example 4 Find all real solutions to $\frac{10}{x} - \frac{12}{x-3} + 4 = 0$

Radical Equations

Example 5 Find all real solutions to the equation: $\sqrt{x+2} + x = 4$

Example 6 Find all real solutions to the equation: $x^{1/2} + 3x^{-1/2} = 10x^{-3/2}$

Example 7 Find all solution to the equation: $x^4 - 9x^2 + 20 = 0$

Example 8 Solve the absolute value equation: $2|3x + 4| - 10 = 0$