

College Algebra

Day 7 Sections 3.2 and 3.3

Quadratic Equations

Standard Form:

Solving Quadratic Equations:

Factoring:

Some examples:

Review the Square Root Property:

Examples: Solve for the indicated variable

(a) $(1 - 3x)^2 = 49$

(b) $(y + 2)^2 - 3 = 17$

(c) $-2(3t - 1)^2 = -25$

(d) $(5z + 7)^2 + 6 = 4$

Completing the Square:

Examples: Solve for the indicated variable by completing the square

(a) $x^2 - 6x - 49 = 0$

(b) $2y^2 + 4y - 5 = 27$

(c) $3t^2 - 2t = -5$

(d) $z^2 + 6z = 14$

Derivation of the Quadratic Formula by completing the square on the general quadratic equation $ax^2 + bx + c = 0$, $a > 0$

Example: Solve using the quadratic formula:

$$5x^2 + 14x = 3$$

Now, resolve the example using a simpler method.

The Discriminant: $b^2 - 4ac$ **and types of solutions to quadratic equations.**

Application: Projectile Motion

The height, h , of a projectile above the ground at any time t can be modeled by the quadratic equation $h(t) = -16t^2 + v_0t + h_0$ where h_0 represents the initial height and v_0 the initial velocity.

Example: Albert hits a baseball from an initial height of 3 feet and with an initial velocity of 120 feet per second. Approximate the maximum height of the baseball during its flight. If it is not caught by the outfielder, how far will the ball travel before it hits the ground?

Section 3.3: Complex Numbers

Arose from the equation $x^2 + 1 = 0$

The imaginary unit:

Definition of a complex number

Simplifying Radicals with Negative Radicands

Examples:Simplify

(a) $-\sqrt{-49}$ (b) $3\sqrt{-20}$ (c) $\sqrt{-6} \cdot \sqrt{-3}$

Note: The property $\sqrt{a} \cdot \sqrt{b} = \sqrt{ab}$ is valid if both $a \geq 0$ and $b \geq 0$ are true.

Operations with Complex Numbers

Addition, Subtraction, Multiplication, and Division

The conjugate of $a + bi$

Writing answers in standard form:

Examples: Perform the indicated operation

(a) $(-2 + i) + (6 - 2i)$

(b) $(-3i) - (4 - 5i)$

(c) $(-3 + 2i) \cdot (1 - i)$

(d) $\frac{2}{3 - i}$

Quadratic Equations with complex solutions:

Example: Solve the quadratic equation and support the result graphically

(a) $2x^2 + 4 = 1$ (b) $x^2 + 4x + 5 = 0$