



Math122 College Algebra

Professor Douglas J. Ryan

Ch1.3

Quadratic Equations

- A quadratic equation is of the form $ax^2 + bx + c = 0$
where a, b, c are real numbers and $a \neq 0$
- We can solve quadratic equations by
 1. factoring
 2. using the zero product property
 $AB = 0$ if and only if $A = 0$ or $B = 0$

Solving Quadratic Equations by Factoring

- Solve the equation $3x^2 - 7x = -4$

- Check your solution.

Completing the Square

- Remember we solved equations of the form $(x \pm a)^2 = c$
- Completing the square
 - To make $x^2 + bx$ a perfect square, we add $\left(\frac{b}{2}\right)^2$
 - $x^2 + bx + \left(\frac{b}{2}\right)^2 = \left(x + \frac{b}{2}\right)^2$

Problem

- For each of the following expressions, complete the square

1. $x^2 + 10x$

2. $x^2 - 3x$

3. $x^2 - \sqrt{3}x$

Problem

- Solve each equation by completing the square and check your results

1. $y^2 - 8y + 9 = 0$

2. $4a^2 - 8a - 3 = 0$

Quadratic Formula

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

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

- What are the constants a , b , and c for each quadratic equation

1. $x^2 = 3 - 4x$

2. $5y^2 = 4y$

Problem

- Find all solutions of each equation using the quadratic equation

1. $\frac{x^2}{2} - \frac{5}{6}x - \frac{1}{3} = 0$

2. $x^2 + 2x + 2 = 0$

Discriminant

- The discriminant of $ax^2 + bx + c = 0$ where $a \neq 0$ is $D = b^2 - 4ac$
 1. if $D > 0$ then two real solutions exist
 2. if $D = 0$ then exactly one real solution exists
 3. if $D < 0$ then no real solution exists

Applications

- Find two positive integers whose difference is 2 and whose product is 48.

Applications

- A rectangular bedroom is 7 ft longer than it is wide. If the area of the room is 228ft^2 , what is the width of the room.