Lecture 1

Wednesday, September 3, 2025 6:31 AM

This course prepares you to take Calculus (Math 212).
We will cover Chapter 1,2,3,4,10 of the textbook, which cover the following topics:

- Chapter 1: Solving linear, quadratic and other equations that can be transformed into these types of equations.
- Chapter 2: Functions, graphing functions, transformation of functions
- Chapter 3: Two special types of functions: polynomials and rational functions
- Chapter 4: Exponential and logarithmic functions
- Chapter 10: Solving a system of linear equations; matrices

Goal for today: linear equation and quadratic equation

Linear equation: $ax + b = 0$
Quadratic equation: $ax^2 + bx + c = 0$

You can solve a quadratic equation using *factorization* or *quadratic formula*. The origin of the factorization method is the fact that if s is a solution then $ax^2 + bx + c$ has a factor $(x - s)$. The origin of the quadratic formula is the completing-the-square method.

$$ax^2 + bx + c = 0 \Leftrightarrow x^2 + \frac{b}{a}x + \frac{c}{a} = 0 \Leftrightarrow \left(x + \frac{b}{2a}\right)^2 + \frac{4ac - b^2}{4a^2} = 0$$

Examples:

$2x^2 - 3x + 1 = 0$
$x^2 + 3x = -2$

It can happen that a quadratic equation has no (real) solutions. For example,

$$x^2 + x + 1 = 0$$

The sign of the quantity $\Delta = b^2 - 4ac$ determines whether the quadratic equation has real solutions or not (and how many of them there are). For that reason, Δ is called the *discriminant*.