

O/L Mathematics

Theory Of Algebra

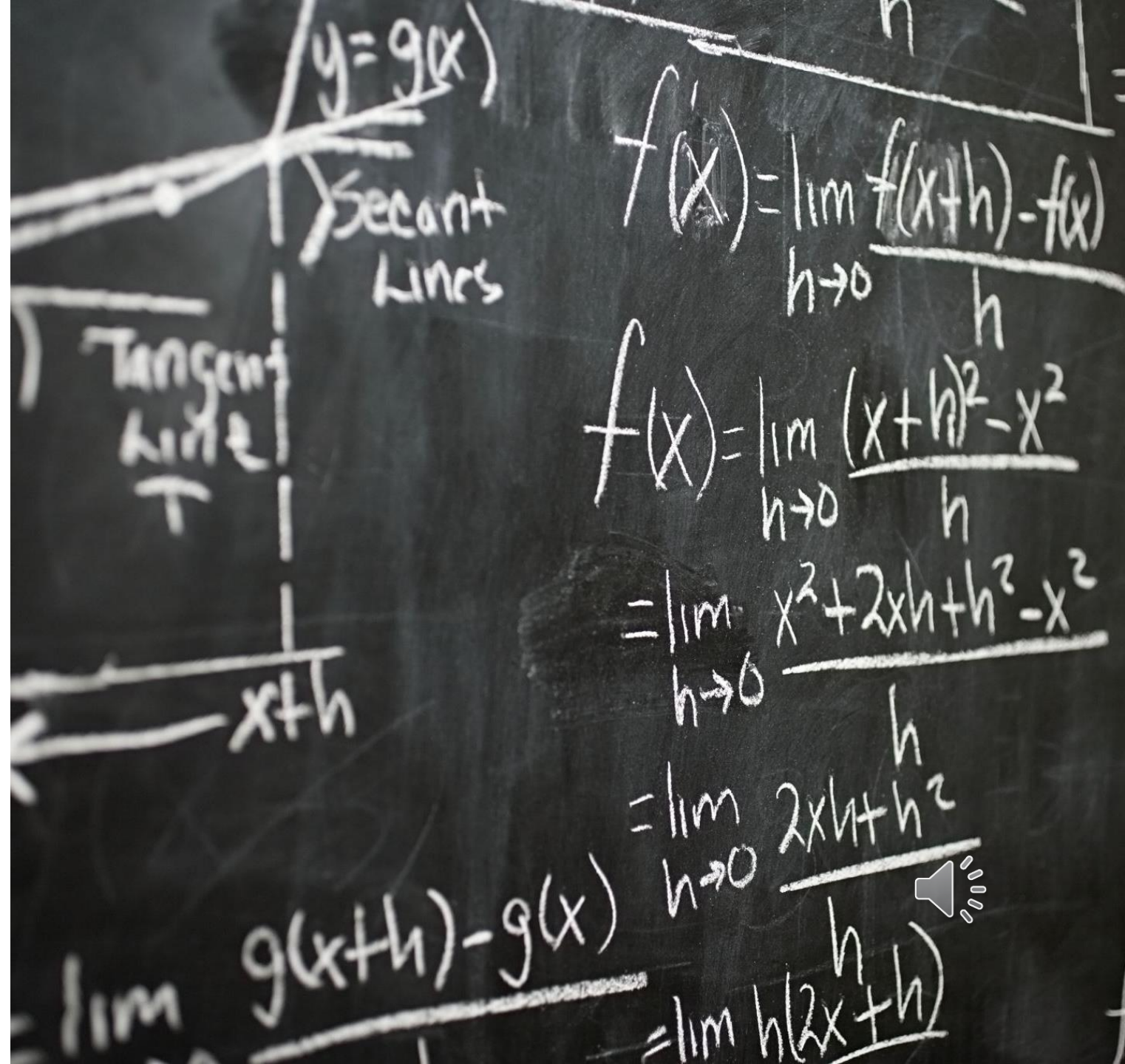


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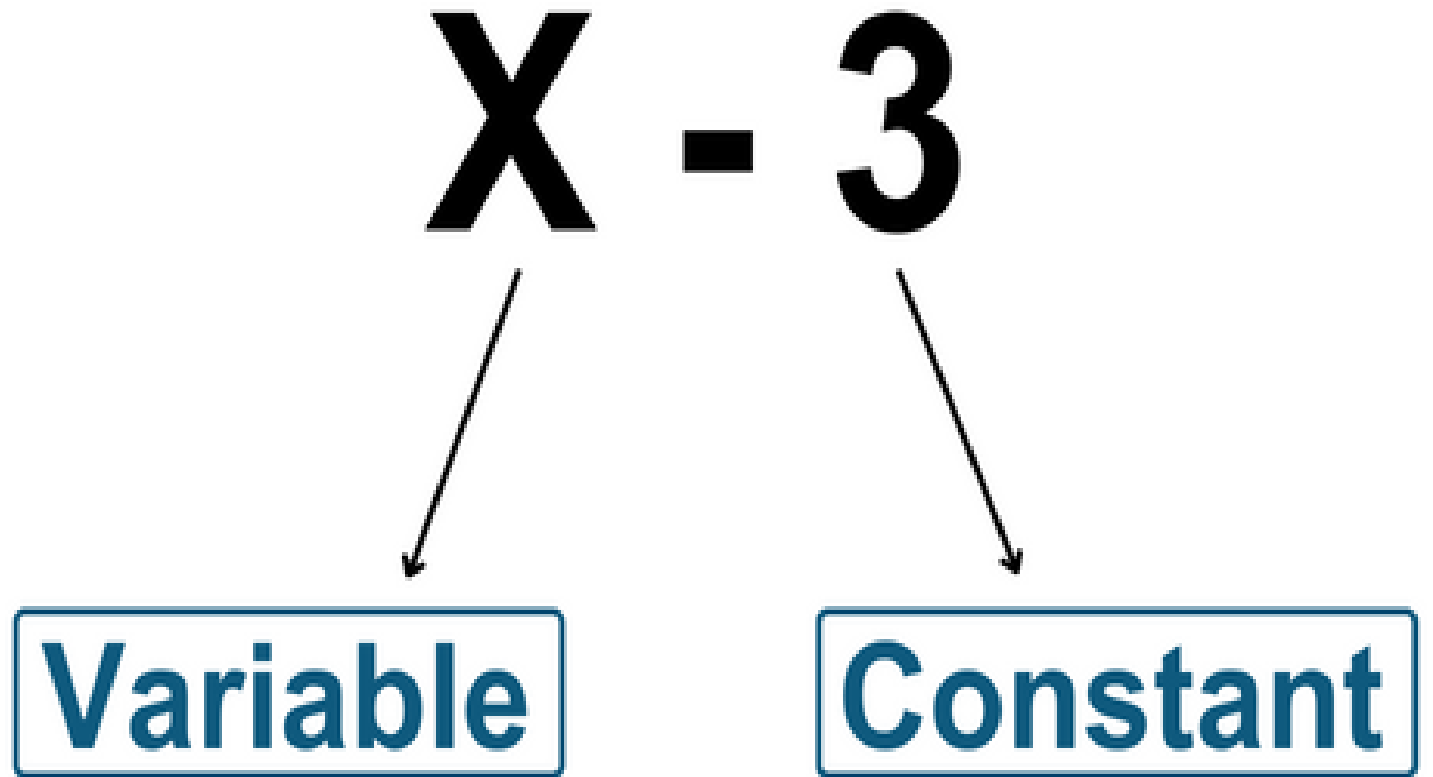
What is Algebra?

Algebra is a branch of mathematics that deals with mathematical symbols and the rules for manipulating these symbols. It involves the study of mathematical structures, relationships, and operations on variables. The fundamental goal of algebra is to understand the properties of mathematical objects and the rules governing their manipulation.



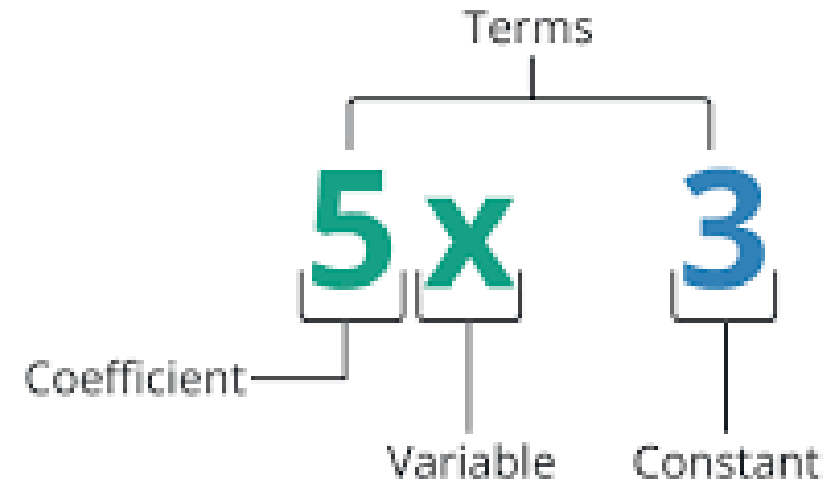
Basic Concepts in Algebra

- **Variables and Constants**
 - Variables are symbols that can take on different values.
 - Constants are fixed numerical values.



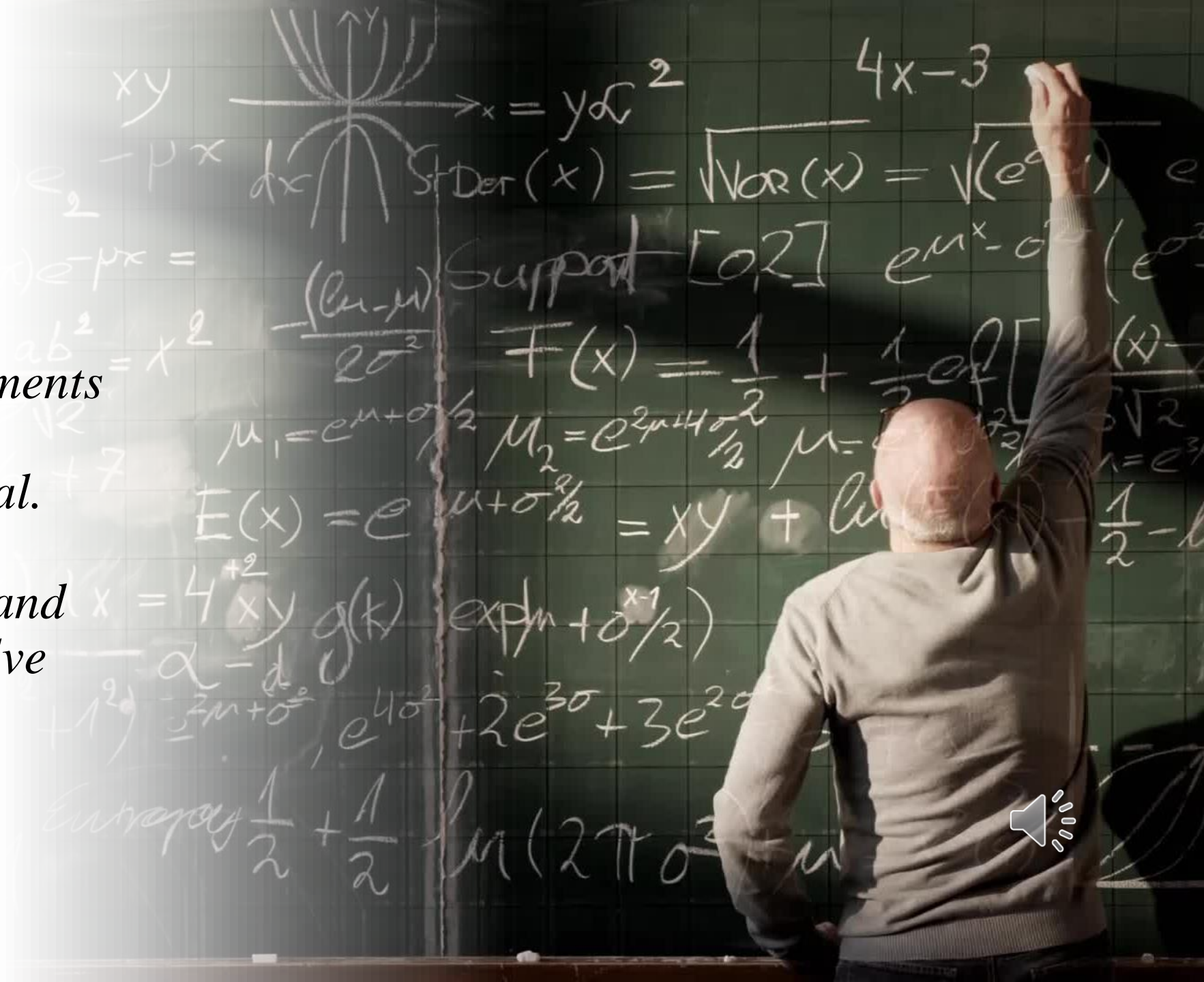
Algebraic Expressions

- *Algebraic expressions are combinations of variables, constants, and mathematical operations such as addition, subtraction, multiplication, division*



Equations

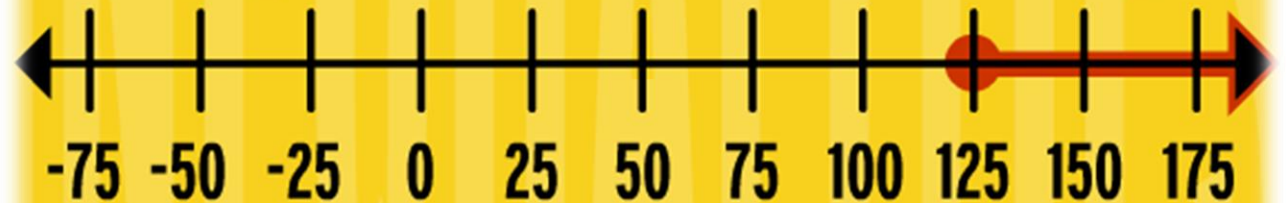
Equations are statements asserting that two expressions are equal. They often involve unknown variables and provide a way to solve for those variables



Inequalities

Inequalities express relationships between two expressions, indicating that one is greater than, less than, or equal to the other

$$x \geq 125$$



$$3x^2 + 1x^1 - 5x^0$$

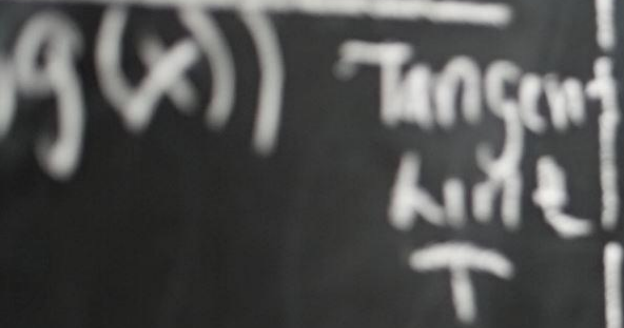
Polynomials

Polynomials are expressions consisting of variables and coefficients, combined using addition, subtraction, and multiplication



Functions

Functions describe mathematical relationships between sets of inputs and outputs. Algebraic functions are often represented by equations involving variables



$$f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$$

$$f(x) = \lim_{h \rightarrow 0} \frac{(x+h)^2 - x^2}{h}$$

$$= \lim_{h \rightarrow 0} \frac{x^2 + 2xh + h^2 - x^2}{h}$$

$$= \lim_{h \rightarrow 0} \frac{2xh + h^2}{h}$$

$$= \lim_{h \rightarrow 0} h(2x + h)$$

$$= \lim_{h \rightarrow 0} \frac{g(x+h) - g(x)}{h}$$

Matrix:

$$A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$$

Determinant:

$$\det(A) = |A| = \begin{vmatrix} a & b \\ c & d \end{vmatrix}$$

Matrices and Determinants

Matrices are arrays of numbers, and determinants are special numbers associated with square matrices



Covered Points

- Introduction To Algebra
- Basic Concepts in Algebra
 - Variables and Constants
 - Expressions
 - Equations
 - Inequalities
 - Polynomials
 - Functions
 - Matrices



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