

## Math 150 Lecture Notes Polynomials

A **variable** is a letter that can represent any number from a given set of numbers.

An **algebraic expression** is an indicated operation, power, or root that involved variables.

A **monomial** is an expression of the form  $ax^k$ , where  $a$  is a real number and  $k$  is a nonnegative integer.

A **binomial** is a sum of two monomials; a **trinomial** is the sum of three monomials.

A **polynomial** is a sum of monomials, an expression of the form

$$a_n x^n + a_{n-1} x^{n-1} + \cdots + a_1 x + a_0$$

Where  $a_0, a_1, \dots, a_n$  are real numbers, and  $n$  is a nonnegative integer.

If  $a_n \neq 0$ , then the polynomial has **degree**  $n$ . The monomials  $a_k x^k$  that make up the polynomials are called the **terms** of the polynomial.

### Combining Algebraic Expressions

The properties of real numbers are used to **add** and **subtract** polynomials.

The Distributive Property is used repeated to find the **product** of polynomials.

### **Special Products**

If  $A$  and  $B$  are real numbers or algebraic expressions, then

1.  $(A + B)(A - B) = A^2 - B^2$
2.  $(A \pm B)^2 = A^2 \pm 2AB + B^2$
3.  $(A \pm B)^3 = A^3 \pm 3A^2B + 3AB^2 \pm B^3$

### Factoring

Using the Distributive Property to reverse the process of finding the product of polynomials is called **factoring** an expression, writing it as a product of simpler ones, **factors**.

### **Special Products Factored**

- |                                |   |
|--------------------------------|---|
| 1. Difference of two squares   | $A^2 - B^2 = (A + B)(A - B)$                |
| 2. Perfect square trinomial    | $A^2 \pm 2AB + B^2 = (A \pm B)^2$           |
| 3. Sum/Difference of two cubes | $A^3 \pm B^3 = (A \pm B)(A^2 \mp AB + B^2)$ |