

Section 16 Polynomials

Definition: A term of the form ax^n where n is a whole number is a **monomial**. A **polynomial** is a monomial or a sum of monomials. The **degree** of a term is the number of variable factors in that term. If there is only one variable, then the degree is the same as the exponent on the variable. The **coefficient** of a term is the constant part of the term. The **degree** of a polynomial is the same as the degree of its term of highest degree. The **leading coefficient** is the coefficient of the highest degree term.

Example 1: Identifying the Degree and Leading Coefficient of a Polynomial

Find the degree and coefficient of each term and the degree of each polynomial.

a) $2x^4 - 3x + 5$

b) $-2x^3y^3 - 3x^3y^2 + 5y$

c) $12x^4 - 2x^3 - 3x^3 + 5$

Evaluating Polynomials

Polynomials can be evaluated by substituting a numeric value into the expression in place of the variable.

Example 2: Evaluating Polynomials

Evaluate $-x^2 + 4x - 5$ for $x = -2$.

Addition and Subtraction of Polynomials

Example 3: Addition of Polynomials

Add:

a. $(-x^2 + 4x - 5) + (-4x^2 + 3x - 15)$

b. $(x^2y^2 - 3xy + y^2) + (-3x^2y + 2xy - 5y^2)$

Subtraction of Polynomials

The Opposite of a Polynomial

The opposite of $-4x^2 + 3x - 15$ is $-(-4x^2 + 3x - 15) = 4x^2 - 3x + 15$

Example 4: Subtraction of Polynomials

a) $(x^2 - 3x + 1) - (-3x^2 + 2x - 5)$

b) $x^3 + 3x^2 - 2x - 5 - (-3x^3 - 2x^2 - 3x + 7)$

Multiplication of Polynomials

Multiplying Monomials

Example 5: Multiplying of Monomials

Multiply:

a. $(4x^2y^4)(-2x^3y^5)$

b. $(-2x^3y^5z^3)(-4xy^3z^2)$

Example 6: Multiplying a Monomial times a Polynomial

Multiply:

a) $2x(4x - 3)$

b) $-2xy^2(x^2y^3 - 5x^3y)$

Example 7: Multiplying two Binomials

Multiply:

a) $(x^3 - 4)(2x^3 + 3)$

b) $(2x - y)(x - 3y)$

This is unfinished!!