

Polynomials: Basics

A. Definition of a Polynomial

A polynomial is a combination of terms containing numbers and variables raised to positive (or zero) whole number powers.

Examples of Polynomials

$$3x^5y^3 - 4xy^4 + 5x^2y - 6$$

$$4x^2 + 2x^5 - 7$$

NOT polynomials

$$2x^{\frac{1}{2}} + 4 \quad (\text{power is a fraction})$$

$$4x^{-1} - 2x^3 \quad (\text{power is negative})$$

B. Terminology

1. Degree

a. **Term Degree: sum of powers in a term**

$$x^5y^3 \quad \text{the degree is 8}$$

$$xy^2z \quad \text{the degree is 4}$$

$$4 \quad \text{the degree is 0}$$

b. **Polynomial Degree: maximum (not total) term degree**

$$3x^5y^3 - 4xy^4 + 5x^2y - 6 \quad \text{the degree is 8}$$

$$4x^2 + 2x^5 - 7 \quad \text{the degree is 5}$$

2. **Descending Order**

We often write polynomials in order from the highest term degree to the the lowest.

For instance, we rewrite $4x^2 + 2x^5 - 7$ as $2x^5 + 4x^2 - 7$

C. **Adding/Subtracting Polynomials**

We combine like terms as before.

Beware: minus signs and parentheses

1. Find $(6x^2 - 4x - 3) + (3x^2 + 4)$

$$\boxed{9x^2 - 4x + 1}$$

2. Find $(5x^3 + 3x - 2) - (6x^2 - 4x + 2)$

$$5x^3 + 3x - 2 - 6x^2 + 4x - 2 = \boxed{5x^3 - 6x^2 + 7x - 4}$$