Identify Polynomials

A polynomial in \( x \) is an expression containing the sum of a finite number of terms of the form \( ax^n \) where \( a \) is any real number and \( n \) is a nonnegative integer.

\[
5x^2 \quad -3x^3 + 2x^2 - 8 \quad \frac{4}{5}x^5 - 2x^4 + \sqrt{7}x^2
\]

Descending order:

Ascending order:

Monomial:

Binomial:

Trinomial:

Degree of a polynomial:

Example 1  State whether or not each expression is a polynomial. If so, state the degree and special name (monomial, binomial, etc).

a. \( 6x^4 - 2x^2 \)  

b. \( \pi x^7 - \frac{1}{3}x^5 + 24x \)

c. \( -2x^3 + 5x^{-2} - 4x \)  

d. \( 7x^{3/2} + x - 4 \)

e. \( -15a^2b - 2ab^2 + 14ab - 22 \)  

f. 12

Example 2  Express each polynomial in descending order and state the degree of the polynomial.

a. \( -3x + x^2 - 5x^5 + 21 + 7x^3 \)  

b. \( 14t^3 - 15t + 27 + t^6 - 5t^4 + 12t \)
2 Add Polynomials

To add polynomials, combine like terms – terms that have the same variable with the same exponent.

Example 3 Add the polynomials.

a. \((t + 7) + (-3t - 8)\)

b. \((x^2 - 5x + 10) + (9x^3 - 2x^2 + 4x - 15)\)

c. \((-4p^2 - 3p - 2) + (-p^2 - 4)\)

d. \((x^2y + x - xy) + (2x^2y + 2xy - 6y + 3)\)

3 Subtract Polynomials

1. Change subtraction to addition of the opposite, i.e. distribute the negative sign to each term inside the parentheses.
2. Add by combining like terms.

Example 3 Subtract the polynomials.

a. \((8m + 3) - (2m + 4)\)

b. \((6y^2 + 4y + 19) - (-2y^3 + 5y^2 + 3y + 9)\)

c. \((2x^2y + 2xy - xy^2) - (-5x^3y + 2xy + 7xy^2 + 3x - 2)\)

d. \((3x^2 - 4x) - (-2x^2 + 14x - 1)\)