

Algebra 2

Ch. 6 Handout 6.1

Polynomial Functions

Polynomial Function

$P(x) = a_n x^n + a_{n-1} x^{n-1} + \dots + a_1 x^1 + a_0$ where n is a nonnegative and the coefficients $a_n, \dots, a_0$ are real numbers.

Naming a Polynomial by degree

Zero degree -- Constant

$$5$$

One degree -- Linear

$$2x + 3$$

Second degree -- Quadratic

$$x^2 - 4x + 1$$

Third degree -- Cubic

$$x^3 - 3x^2 - 4x$$

Fourth degree -- Quartic

$$x^4 - 2x + 1$$

Fifth degree -- Quintic

$$3x^5$$

Naming a polynomial by number of terms

One term -- Monomial

$$4xy$$

Two terms -- Binomial

$$x^2 - 4$$

Three terms -- Trinomial

$$4x^3 + 2x + 1$$

Four terms -- polynomial of 4 terms

Match with polynomial example .

Polynomial Example	Degree	Name using degree	Number of Terms	Name Using Number of Terms
8	0	Constant	1	Monomial
$x - 12$	1	Linear	2	Binomial
$-4x^2$	2	Quadratic	1	Monomial
$x^3 - 3x^2 - 6x$	3	Cubic	3	Trinomial
$3x^4 + x^2$	4	Quartic	2	Binomial
$-x^5 + 2x^2 - x + 7$	5	Quintic	4	Polynomial of 4 terms

The diagram shows the polynomial $P(x) = 2x^3 - 5x^2 - 2x + 5$ enclosed in a large rectangular box. The entire expression is labeled "Polynomial" with an arrow pointing to the right. Inside the box, the coefficient "2" is highlighted with a smaller square, and an arrow labeled "Leading Coefficient" points to it from the left. Below the box, four terms are identified with upward-pointing arrows: "Cubic term" points to $2x^3$, "Quadratic term" points to $-5x^2$, "Linear term" points to $-2x$, and "Constant" points to $+5$.

$$P(x) = \boxed{2x^3 - 5x^2 - 2x + 5} \leftarrow \text{Polynomial}$$

Leading Coefficient

Cubic term

Quadratic term

Linear term

Constant

1. Classifying Polynomials: Write each polynomial in standard form. Then classify it by degree and by number of terms.

a) $9 + x^3$

$$x^3 + 9$$

Cubic ; Binomial

b) $x^3 - 2x^2 - 3x^4$

$$-3x^4 + x^3 - 2x^2$$

Quartic ; trinomial

1. **Classifying Polynomials:** Write each polynomial in standard form. Then classify it by degree and by number of terms.

c) $\underline{4x} - \underline{6x} + 5$

$$-2x + 5$$

Linear; Binomial

d) $\underline{3x^3} + x^2 - 4x + \underline{2x^3}$

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

Cubic; trinomial

1. **Classifying Polynomials:** Write each polynomial in standard form. Then classify it by degree and by number of terms.

e) $6 - 2x^5 + 3x^3$

$$-2x^5 + 3x^3 + 6$$

Quintic ; trinomial

f) 6

Constant ; monomial

1. **Classifying Polynomials:** Write each polynomial in standard form. Then classify it by degree and by number of terms.

g) $4x(5x)$

$20x^2$
Quadratic; monomial

h) $x^3(3-x)$

$3x^3 - x^4$
 $-x^4 + 3x^3$

Quartic; Binomial

2. Simplify. Classify each result by number of terms

a) $-\underline{x^2} + 2x + \underline{x^2}$

$$2x$$

Linear; monomial

b) $3x(4x) + x^2(2x^2)$

$$12x^2 + 2x^4$$

$$2x^4 + 12x^2$$

Quartic, Binomial

2. Simplify. Classify each result by number of terms.

$$c) (\underline{20x^3} - \underline{39x^2} + 5x) + (\underline{40x^3} - 75 - \underline{6x^2})$$

$$60x^3 - 45x^2 + 5x - 75$$

cubic; polynomial of 4 terms

2. Simplify. Classify each result by number of terms.

d) $(2x+1)^2 + 3$

$(2x+1)(2x+1) + 3$

$4x^2 + \underline{2x} + \underline{2x} + \underline{1} + \underline{3}$

$4x^2 + 4x + 4$

Quadratic; trinomial

2. Simplify. Classify each result by number of terms.

e) $(-2x^3 + 7x^2 - 6) - (-4x^3 + 9x^2 - 7x + 15)$

$$\underline{-2x^3} + \underline{\underline{7x^2}} - \underline{\underline{6}} + \underline{4x^3} - \underline{\underline{9x^2}} + 7x - \underline{\underline{15}}$$

$$2x^3 - 2x^2 + 7x - 21$$

cubic ; polynomial of 4 terms

2. Simplify. Classify each result by number of terms.

$$f) (x+2)^3 = (x+2)(x+2)(x+2)$$

$$(x+2)(x^2 + 2x + 2x + 4)$$

$$(x+2)(x^2 + 4x + 4)$$

$$x^3 + \underline{4x^2} + \underline{4x} + \underline{2x^2} + \underline{8x} + 8$$

$$x^3 + 6x^2 + 12x + 8$$

cubic; polynomial of 4 terms

Assignment:

Pgs 309-311 1-12 all, 25-30 all,
34-58 all