MATH 1010 ~ Intermediate Algebra

Chapter 5: POLYNOMIALS AND FACTORING

Section 5.2: Adding and Subtracting Polynomials

Objectives:

- Identify leading coefficients and degrees of polynomials.
- Add and subtract polynomials using vertical and horizontal format.
- Use polynomials to model and solve real life problems.

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

Definition of a polynomial

ex $3x^4 - 5x^2 + 2x + 1$

$a_4 = 3$ $n = 4$

$a_3 = 0$

$a_0 = 1$

$$a_n x^n + a_{n-1}x^{n-1} + a_{n-2}x^{n-2} + \ldots + a_2 x^2 + a_1 x + a_0$$

Vocabulary

Degree = n — highest exponent (degree or power) on variable

Leading coefficient = a_n — coefficient of highest degree term

Constant term = a_0 — the "plain" number

Binomial — two-termed polynomial ex $3x^{10} - 4x^5$

Trinomial — three-termed polynomial

Monomial — one-termed polynomial

Standard form

descending order

State whether these are monomial, binomial or trinomial. State degree, leading coefficient and constant.

a) $3 - x^2 = -x^2 + 3$

binomial

l.c. = −1, degree = 2

constant = 3

b) $4x^3$

monomial

degree = 3

l.c. = 4

constant = 0

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

trinomial

degree = 3

l.c. = 1

constant = −2

Are these polynomials? Why?

a) $x^{-2} + 7x - 2$

$= \frac{1}{x^2} + 7x - 2$

NO because dividing by x^2

b) $\frac{1}{2x} - x + 1$

NOT polynomial

c) $\frac{2}{3}x^3 - 2x$

IS polynomial

degree = 3

l.c. = 2/3

constant = 0

① EXAMPLE

Combine like terms and put in standard form.

a) $(2x^4 + 3x^2 - x^2 + 5x + 7) + (3x^2 - x + 1)$

$= 2x^4 + 3x^2 - x^2 + 5x + 7 + 3x^2 - x + 1$

$= 2x^4 + 5x^2 + 4x + 8$

b) $(6t - 4t^3 - t^2 + 3) - (3t^2 - 50)$

$= 6t - 4t^3 - t^2 + 3 - 3t^2 + 50$

$= -4t^3 - 4t^2 + 6t + 53$

c) $(15-2y+y^2)+(3y^2-6y+1)-(4y^2-8y+16)$

$= 15 - \cancel{2y} + \cancel{y^2} + \cancel{3y^2} - \cancel{6y} + 1 - \cancel{4y^2} + \cancel{8y} - 16$

$= 0$

degree: 0

constant: 0

d) $(x^{2m}-6x^m+4)-(2x^{2m}-4x^m-3)$

$= x^{2m} - 6x^m + 4 - 2x^{2m} + 4x^m + 3$

$= -x^{2m} - 2x^m + 7$

degree: 2m

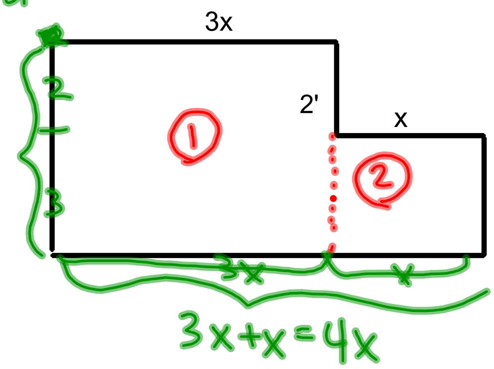
l.c. = -1

const = 7

Application

Find an expression in terms of x for the perimeter and for the area of this figure. Evaluate each if x = 6ft.

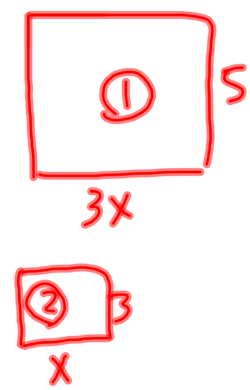
P= distance around shape



$P = 5 + 4x$
$+ 3 + x + 2$
$+ 3x$

$\boxed{P = 8x + 10 \text{ ft}}$

Area = space inside shape



$A = 3x(5) + 3(x)$

$A = 15x + 3x$

$\boxed{A = 18x \text{ ft}^2}$

If $x = 6$ ft,

$P = 8(6) + 10 = 48 + 10 = 58$ ft.

$A = 18(6) = 108 \text{ ft}^2$