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Section 10

§1.3 Algebraic Expression

Def: A monomial is a function of the form ax^n

a = real number constant

n = non-negative whole number.

Ex: Monomials:

x^2, $2x^4$, 3

↑ degree is the exponent on x.

degrees 2, 4, 0.

Def: A binomial is a sum or difference of 2 monomials.

A trinomial is "_____"

"_____" of 3 monomials.

A polynomial is a sum/difference of monomials.

Def: The degree of a polynomial is the highest exponent that appears on the variable (when the poly is expanded)

Ex: $x^9 - 10^{20}x^3$ degree: 9

$x(x+1)(2-x^4)$ degree: 6.

Algebra Review: Working w/ Polynomials:

Ex 1: Expand the polynomial:

(a) $(3x+5)^2 = (3x+5)(3x+5)$ F.O.I.L.

$= 9x^2 + 15x + 15x + 25$

$= 9x^2 + 30x + 25$

(or use squaring formula:
$(a+b)^2 = a^2 + 2ab + b^2$)

(b) $(2x - \sqrt{y})(2x + \sqrt{y}) = 4x^2 + 2x\sqrt{y} - 2x\sqrt{y} - y$

$= 4x^2 - y$

(or use diff squares:
$(a-b)(a+b) = a^2 - b^2$)

Ex2: Factoring (rewrite as a product of factors)

Pg 29 Factoring formulas

(a) $2x^4 - 8x = 2x(x^3 - 4) = 2x(x^3 - \sqrt[3]{4})(x^2 + \sqrt[3]{4}x + \sqrt[3]{4^2})$

↑ ugly to factor ....

(b) $2x^4 - 8x^2 = 2x^2(x^2 - 4) = 2x^2(x+2)(x-2)$

(c) $x^4 - x = x(x^3 - 1) = x(x-1)(x^2 + x + 1)$

↑ factoring formula pg 29

$A^3 - B^3 = (A-B)(A^2 + AB + B^2)$

Factoring fractional exponents

Ex3: $3x^{3/2} - 9x^{1/2} + 6x^{-1/2}$

$= 3x^{-1/2}(x^2 - 3x^1 + 2)$ (pull out smallest exponent of x)

$= 3x^{-1/2}(x-2)(x-1)$

$= \frac{3(x-2)(x-1)}{x^{1/2}} = \frac{3(x-2)(x-1)}{\sqrt{x}}$

Ex 4: $(2+x)^{-2/3}x + (2+x)^{1/3}$

$= (2+x)^{-2/3}\left(x + (2+x)^{1}\right)$

$= (2+x)^{-2/3}(2+2x)$

$= \boxed{\dfrac{2(1+x)}{\left(\sqrt[3]{2+x}\right)^2}}$

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§1.4: Domain: Given a function $f(x)$, the domain of f is simply all real values x that can be plugged into f.

Ex: Find domain:

(a) $y = x^2$ D: $\mathbb{R}$, $(-\infty, \infty)$

(b) $f(x) = \dfrac{1}{x+1}$, Can't Divide by zero.

D: $x \neq -1$

$(-\infty, -1) \cup (-1, \infty)$

Recall: ( ) ↑ excluded

[ ] ↑ included

© $f(x) = \sqrt{9-x}$

$9-x \geq 0$

$9 \geq x$

D: $9 \geq x$

$(-\infty, 9]$