Review of Exponents; Polynomials

Note Title 8/19/2007

Objectives: 1) Use rules of exponents to simplify expressions

2) Perform operations with polynomials

Objective 1: Rules of Exponents

$b^n = b \cdot b \cdot b \cdots b$ $\quad n = 1, 2, 3, \ldots$

$b^0 = 1$ $\quad (b \neq 0)$

$b^{-n} = \frac{1}{b^n}$ $\quad (b \neq 0)$

$$x^m \cdot x^n = x^{m+n}$$

Product Rule

$$(x^m)^n = x^{mn}$$

$$(xy)^n = x^n y^n$$

$$\left(\frac{x}{y}\right)^n = \frac{x^n}{y^n}$$

Power Rules

$$\frac{x^m}{x^n} = x^{m-n}$$

Quotient Rule

Examples: Evaluate the expression.

1) $(-6)^2 = (-6)(-6) = 36$

2) $-6^2 = -6 \cdot 6 = -36$

3) $6^{-2} = \frac{1}{6^2} = \frac{1}{36}$

4) $(-6)^0 = 1$

5) $-6^0 = -1$

$(-p)^n$ base is $-p$

$-p^n$ base is p

Examples:

1) $(-3x^2)(4x^1)(x^{10}) = -12x^{13}$

2) $(-2y^5)^3(3y^2) = (-2)^3(y^5)^3(3y^2)$
$= -8y^{15} \cdot 3y^2 = -24y^{17}$

3) $\dfrac{6x^2}{3x^{-4}} = 2x^{2-(-4)} = 2x^6$

4) $\left(\frac{5x^{-3}}{y^2}\right)^{-2} = \frac{(5)^{-2}(x^{-3})^{-2}}{(y^2)^{-2}} = \frac{(5)^{-2}x^6}{y^{-4}} = \frac{x^6y^4}{5^2}$

$= \frac{x^6y^4}{25}$

Obj. 2 Operations with Polynomials

1) Add: $(3x^2-5x+7)+(4x^2-2x-8)$

$3x^2-5x+7+4x^2-2x-8$

$7x^2-7x-1$

2) Subtract: $(3x^2-5x+7)-1(4x^2-2x-8)$

$3x^2-5x+7-4x^2+2x+8 = -x^2-3x+15$

3) Multiply:

$2x(4x-3) = 8x^2 - 6x$

FOIL

$(x-5)(3x+7) = 3x^2 + 7x - 15x - 35$

$= 3x^2 - 8x - 35$

$(2x-5)(2x+5) = 4x^2 + 10x - 10x - 25$

$= 4x^2 - 25$

$(a-b)(a+b) = a^2 - b^2$

$(2x-5)^2 = (2x-5)(2x-5)$

$= 4x^2 - 10x - 10x + 25$

$= 4x^2 - 20x + 25$

Square of a Binomial $\Rightarrow$ Trinomial

$3x(x-4)^2 = 3x(x-4)(x-4)$

$= 3x(x^2 - 4x - 4x + 16)$

$= 3x(x^2 - 8x + 16)$

$= 3x^3 - 24x^2 + 48x$

$(a+b)^2 = a^2 + 2ab + b^2$

$(a-b)^2 = a^2 - 2ab + b^2$

$$(x-2)^3 = (x-2)(x-2)(x-2)$$

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

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

$$= x^3-4x^2+4x-2x^2+8x-8$$

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

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

$$= x^3+2x^2+4x-2x^2-4x-8$$

$$= x^3-8$$