Homework Q's

Note Title 3/3/2015

4.2 #85 $\dfrac{(3x^{-2}y^{-4})(4x^{3}y^{-2})^{-2}}{(3x^{3}y^{-2})^{-2}}$

$= \dfrac{3x^{-2-4}\cdot 4^{-2}x^{-6}y^{4}}{3^{-2}x^{-6}y^{4}} = \dfrac{3}{\dfrac{x^{2}y^{4}\cdot 4^{2}x^{6}}{y^{4}\cdot 3^{2}x^{6}}}$

$= \dfrac{3\cdot 9\,x^{6}y^{4}}{16x^{8}y^{8}} = \boxed{\dfrac{27}{16x^{2}y^{4}}}$

4.3: Operations with Monomials

Polynomial: expression composed of terms added together, in which each term has variables to positive integer powers only.

Examples of polynomials: $-5x^{3}-7x^{2}+6$

$1-8x^{4}$

$\frac{2}{5}x^{4}-\frac{7}{3}x^{3}+\frac{1}{10}x^{2}$

$2x^{2}y^{3}-4xy+5x^{3}-8x^{2}y$

Not polynomials: $7x^{-3}+4x^{-2}$

$\frac{2}{x^{5}}+\frac{3}{x^{4}}$ ← Could write as $2x^{-5}+3x^{-4}$

$\sqrt{x^{2}+7x^{3}}$ $\sqrt{x}$ ← could write as $x^{1/2}$

Degree of a polynomial

* If it has 1 variable, the degree is the largest exponent.

* If it has 2 or more variables, the degree is the largest total exponent.

Example:

The degree of $2x^4 - 5x^7 + 13x^2 - 19x$ is 7.

Ex: The degree of $2x - x^5$ is 5.

Ex: What is the degree?

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

- $2x^2y$: total exponent $= 2+1 = 3$
- $5x^3y^4$: total exponent $= 3+4 = 7$ ← BIGGEST
- $-7xy^5$: total exponent $= 1+5 = 6$
- $-8y^4$: total exponent $= 4$

The degree is 7.

Special names for certain polynomials

Polynomial with 3 terms: trinomial
Polynomial with 2 terms: binomial
Polynomial with 1 term: monomial

Examples:

$12x - 5x^2$ is a 2nd degree binomial

$2x^2 - 8x^4 + 1$ is a 4th degree trinomial

Leading term: The term with the highest power.

Leading Coefficient: Coefficient of the leading term.

Ex: $5x - 8x^3 + 4x^6$

Leading term: $4x^6$

Leading Coefficient: 4

6th degree trinomial

Ex: $4x - x^7$

leading term: $-x^7$

Leading coefficient: -1

Multiplying Monomials

Example: $(-3x^4)(5x^2)$

$= \boxed{-15x^6}$

Example: $(-4x^2y^4)(-6x^6y^8z)$

$= \boxed{24x^8y^{12}z}$

Dividing Monomials

Ex: $\frac{36x^7}{-4x^2} = -\frac{9x^5}{1} = \boxed{-9x^5}$

Ex: $\frac{2x^3}{10x^7} = \boxed{\frac{1}{5x^4}}$ Same as $\frac{1}{5}x^{-4}$

4.4: Addition and Subtraction of Polynomials

simplify

Example: $(3x^2 - 9x + 12) + (-8x^2 - 7x - 2)$

$= 3x^2 - 9x + 12 - 8x^2 - 7x - 2$

$= \boxed{-5x^2 - 16x + 10}$

Ex: $(5x^3 - 7x^2 + 19) - (-x^3 + 8x^2 - 5x - 2)$

$= 5x^3 - 7x^2 + 19 - 1(-x^3 + 8x^2 - 5x - 2)$

$= 5x^3 - 7x^2 + 19 + x^3 - 8x^2 + 5x + 2$

$= \boxed{6x^3 - 15x^2 + 5x + 21}$

Matched Problem #4 from p. 344

Subtract $-4x^2 - 3x + 8$ from $x^2 + x + 1$

$x^2 + x + 1 - (-4x^2 - 3x + 8)$

$= x^2 + x + 1 + 4x^2 + 3x - 8$

$= \boxed{5x^2 + 4x - 7}$

Note:

Subtract 5 from 12

$12 - 5 = 7$

4.3 #70) $xy\left(y+\frac{1}{x}\right)$

$= xy(y) + xy\left(\frac{1}{x}\right)$

$= xy^2 + \frac{xy}{x} = xy^2 + \frac{y}{1} = \boxed{xy^2 + y}$

4.5: Multiplication of Polynomials

Example: $4x^3(-2x^4 + 6x^2 - 8)$

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

$= \boxed{-8x^7 + 24x^5 - 32x^3}$

Ex: $-2x^2y^3z(5xy - 8y^3z^2 + 4xyz)$

$= -2x^2y^3z(5xy) - 2x^2y^3z(-8y^3z^2) - 2x^2y^3z(4xyz)$

$= \boxed{-10x^3y^4z + 16x^2y^6z^3 - 8x^3y^4z^2}$

Multiplying polynomials that have 2 or more terms

$(a+b)(c) = ac + bc$

Ex: $(3x+5)(x-8)$

$= 3x(x-8) + 5(x-8)$

$= 3x^2 - 24x + 5x - 40 = \boxed{3x^2 - 19x - 40}$

Ex: $(6x-5)(2x+3)$

$= 6x(2x+3) - 5(2x+3)$

$= 12x^2 + 18x - 10x - 15$

$= \boxed{12x^2 + 8x - 15}$

Ex: $(-2x-7)(4x^3 - 2x^2 + 9x - 1)$

$= -2x(4x^3 - 2x^2 + 9x - 1) - 7(4x^3 - 2x^2 + 9x - 1)$

$= -8x^4 + 4x^3 - 18x^2 + 2x - 28x^3 + 14x^2 - 63x + 7$

$= \boxed{-8x^4 - 24x^3 - 4x^2 - 61x + 7}$

Ex: $(2x^2 - 8x + 5)(6x^2 - 9x - 8)$

$= 2x^2(6x^2 - 9x - 8) - 8x(6x^2 - 9x - 8) + 5(6x^2 - 9x - 8)$

$= 12x^4 - 18x^3 - 16x^2$

$\quad - 48x^3 + 72x^2 + 64x$

$\quad + 30x^2 - 45x - 40$

$= \boxed{12x^4 - 66x^3 + 86x^2 + 19x - 40}$

Plan for next time: 15 min on 4.6
15 min on 4.7
Rest of 4.8

Preceding Assignment:

Read 4.6 (pp 358-360) and 4.7 (pp 365-366)

Rework Example 5 on p. 366
Similar problem: Matched problem #5