Math 115

Spring 2017

Lecture 19

Divide:

① $\dfrac{32x^4y^6 - 16x^3y^4 + 8x^2y^2}{-4x^2y^2}$

$= \dfrac{\cancel{32}^{8}x^4y^6}{-\cancel{4}x^2y^2} - \dfrac{\cancel{16}^{4}x^3y^4}{-\cancel{4}x^2y^2} + \dfrac{\cancel{8}^{2}x^2y^2}{-\cancel{4}x^2y^2}$

$= -8x^2y^4 + 4xy^2 - 2$

$-8x^2y^4$: D=6, C=−8

$+4xy^2$: D=3, C=4

-2: Constant, D=0

Trinomial: D=6, LC=−8

② $\dfrac{x^3 - 4x + 3x^2 - 8}{x+3}$

$x+3 \overline{)\, x^3 + 3x^2 - 4x - 8}$ $\quad x^2 - 4$

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

$-4x - 8$

$-(-4x - 12)$

4

Always

$x^2 - 4 + \dfrac{4}{x+3}$

Use Special products to find

① $(2x^4 + y^3)^2$

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

$= (2x^4)^2 + 2(2x^4)(y^3) + (y^3)^2$

$= 4x^8 + 4x^4y^3 + y^6$

② $(3x^5 - 8y^7)^2$

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

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

$= 9x^{10} - 48x^5y^7 + 64y^{14}$

③ $(2x^8 + 3x^3)(2x^8 - 3x^3)$

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

Conjugates

$= (2x^8)^2 - (3x^3)^2 = 4x^{16} - 9x^6$

Binomial
D = 16
L.C. = 4

USE ~~FOIL method~~ to multiply

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

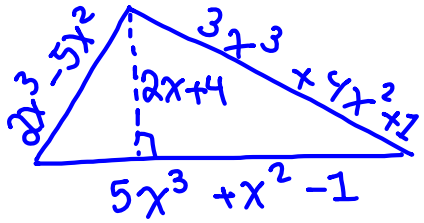
$= 4x^4 + 6x^3 - 10x^2 - 6x^3 - 9x^2 + 15x$
$+ 10x^2 + 15x - 25$

$= 4x^4 - 9x^2 + 30x - 25$

Polynomial with four monomials
D = 4
L.C. = 4
Const. -25

Simplify

$$\frac{(3.2 \times 10^{-12})(4.5 \times 10^{-18})}{9 \times 10^{20}} = 1.6 \times 10^{(-12)+(-18)-20} = 1.6 \times 10^{-50}$$



Find P & A.

$P = a+b+c$

$A = \frac{b \cdot h}{2}$

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

$P = 10x^3$

Final Ans.

$A = \frac{(2x+4)(5x^3+x^2-1)}{2}$

$= \frac{10x^4 + 2x^3 - 2x + 20x^3 + 4x^2 - 4}{2}$

$= \frac{10x^4 + 22x^3 + 4x^2 - 2x - 4}{2}$

$A = 5x^4 + 11x^3 + 2x^2 - x - 2$

Divide $\frac{x^4 - 13x^2 + 36}{x-2}$

Beaware of missing terms such as x^3 & x.

$$x-2 \overline{)\, x^4 + 0x^3 - 13x^2 + 0x + 36}$$

$$x^3 + 2x^2 - 9x - 18$$

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

$$2x^3 - 13x^2 + 0x + 36$$

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

$$-9x^2 + 0x + 36$$

$$-(-9x^2 + 18x)$$

$$-18x + 36$$

$$-(-18x + 36)$$

$$0$$

$x \cdot \boxed{x^3} = x^4$

$x \cdot \boxed{2x^2} = 2x^3$

$x \cdot \boxed{-9x} = -9x^2$

$x \cdot \boxed{-18} = -18x$

Final Ans.

$x^3 + 2x^2 - 9x - 18$

Class Quiz

① Divide: $\dfrac{25x^5 - 15x}{5x^2}$

② Divide: $\dfrac{2x^3 + 5x^2 - 3x - 4}{x - 1}$

③ Simplify: $(x+5)^2 - 10x$

① Always look for GCF

$$32x^4 - 8x = \underbrace{8x}_{\text{GCF}}(4x^3 - 1)$$

$$25x^4y^3 + 15x^3y^4 - 10x^2y^2$$

$$= \underbrace{5x^2y^2}_{\text{GCF}}(5x^2y + 3xy^2 - 2)$$

② Use grouping when factoring 4 or more terms.

$3x^3 - 12x^2 + 15x - 60$

$= 3(x^3 - 4x^2 + 5x - 20)$

GCF

$x^2(x-4) + 5(x-4)$

$= \boxed{3(x-4)(x^2+5)}$

$5x^4 + 20x^3 - 10x^2 - 40x$

$= 5x(x^3 + 4x^2 - 2x - 8)$

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

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

Factoring Trinomials $ax^2 + bx + c$

$P = ac$

$S = b$

Factor

$$2x^2 + 10x - 12$$

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

$P = -6$, $S = 5$

-6

$-1, 6$

$-2, 3$

$$x^2 - 1x + 6x - 6$$

$$= x(x-1) + 6(x-1)$$

$$= \boxed{2(x-1)(x+6)}$$

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

$$= x^2(2x^2 - 3x - 5)$$

$P = -10$, $S = -3$

-10

$1, -10$

$2, -5$

$$2x^2 + 2x - 5x - 5$$

$$2x(x+1) - 5(x+1)$$

$$\boxed{x^2(x+1)(2x-5)}$$

final Ans.

Factor Completely

$$3x^5y^2 - x^4y^2 - 10x^3y^2$$

$= x^3y^2(3x^2 - x - 10)$

GCF

$P = -30$

$S = -1$

-30

1, -30
2, -15
3, -10
5, -6

$3x^2 + 5x - 6x - 10$

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

$x^3y^2(3x+5)(x-2)$

Special Factoring with Binomials:

$A^2 + B^2 = \text{Prime}$

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

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

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

Factor $x^2 + 25 = x^2 + 5^2$

Sum of two sqrs

$=$ **Prime**

Factor $36x^2 - 49 = (6x)^2 - (7)^2$

Difference of two sqrs

$= (6x + 7)(6x - 7)$

Factor $25x^2 - 81y^2 = (5x)^2 - (9y)^2$

$= (5x + 9y)(5x - 9y)$

Factor $72x^4y^2 - 50x^2y^4$

Hint:

GCF First

$= 2x^2y^2(36x^2 - 25y^2)$

$= 2x^2y^2(6x - 5y)(6x + 5y)$

$49x^4 - 144x^2 = x^2(49x^2 - 144)$

$= x^2(7x + 12)(7x - 12)$

$x^3 + 125 = x^3 + 5^3$

Use $A^3 + B^3 = (x+5)(x^2 - 5x + 25)$

$8x^3 + 27 = (2x)^3 + (3)^3$

$= (2x+3)(4x^2 - 6x + 9)$

$125x^3 + 64y^3 = (5x)^3 + (4y)^3$

$= (5x+4y)(25x^2 - 20xy + 16y^2)$

Factor Completely: Hint: GCF First

$54x^4y^2 + 2000xy^5$

$= 2xy^2(27x^3 + 1000y^3)$

$(3x)^3 + (10y)^3$

$= 2xy^2(3x+10y)(9x^2 - 30xy + 100y^2)$

$2xy^2(3x+10y)(9x^2 - 30xy + 100y^2)$

Factor Completely:

$x^4 - 8x = x(x^3 - 8)$ → $x^3 - 2^3$

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

$1000x^7 - 27x^4$

$= x^4(1000x^3 - 27) = x^4(10x - 3)(100x^2 + 30x + 9)$

$(10x)^3 - 3^3$

Special Factoring with Perfect-Sqr Trinomials

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

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

2. Product

$25x^2 + 70x + 49 = (5x + 7)^2$

2. Product

$36x^2 + 132xy + 121y^2 =$

$(6x + 11y)^2$

Product

Twice Product $66xy$

$18x^2 + 60xy + 50y^2$

$= 2[9x^2 + 30xy + 25y^2] = 2(3x + 5y)^2$

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

Factor

$x^2 - 20x + 100 = (x - 10)^2$

$4x^2 - 12x + 9 = (2x - 3)^2$

$64x^2 - 112xy + 49y^2 = (8x - 7y)^2$

Due Monday SG 15. Exam III: Next Thursday