march 08, 2017

Math 115

Spring 2017

Lecture 18

① Simplify: $\left(\dfrac{-5x^{-4}}{y^{-6}}\right)^{-3} = \left(\dfrac{-5y^6}{x^4}\right)^{-3} = \left(\dfrac{x^4}{-5y^6}\right)^{3} = \dfrac{x^{12}}{-125y^{18}}$

$= \boxed{\dfrac{-x^{12}}{125y^{18}}} = \boxed{-\dfrac{x^{12}}{125y^{18}}}$

② Simplify: $\dfrac{(2.5 \times 10^{18}) \cdot (4.6 \times 10^{23})}{2.3 \times 10^{-10}}$

$= 5 \times 10^{18+23-(-10)} = \boxed{5 \times 10^{51}}$

③ Simplify: $\dfrac{(-4x^3y^5)^3}{16x^{-1}y^{24}} = \dfrac{-64x^9y^{15}}{16x^{-1}y^{24}}$

$= \dfrac{-4x^9x^1y^{15}}{y^{24}} = \boxed{\dfrac{-4x^{10}}{y^9}}$

④ Use $(A+B)^2$ to find $(7x^4+4x^3)^2$

$\Rightarrow \quad (A+B)^2 = A^2 + 2AB + B^2$

$(7x^4+4x^3)^2 = (7x^4)^2 + 2(7x^4)(4x^3) + (4x^3)^2$

Trinomial
D=8 , L.C.=49

$\boxed{= 49x^8 + 56x^7 + 16x^6}$

⑤ Use $(A-B)^2$ to find $(10x^6-3)^2$

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

$(10x^6-3)^2 = (10x^6)^2 - 2(10x^6)(3) + (3)^2 = \boxed{100x^{12}-60x^6+9}$

Trinomial
D=12
L.C.=100
Const.=9

⑥ Divide: $\dfrac{120x^8 - 60x^5 + 36x^3}{-6x^4}$

$= \dfrac{120x^8}{-6x^4} - \dfrac{60x^5}{-6x^4} + \dfrac{36x^3}{-6x^4}$

$= -20x^4 + 10x^1 - \dfrac{6}{x^1} = \boxed{-20x^4+10x-\dfrac{6}{x}}$

Not Polynomial

⑦ Use $(A+B)(A-B)$ to find

Binomial
$D=16$, L.C.$=64$

$(8x^3y^5 - 5)(8x^3y^5 + 5)$.

$\rightarrow \boxed{64x^6y^{10} - 25}$

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

Const. $= -25$

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

⑧ Divide: $\dfrac{2x^2 - 7x + 5}{x - 1}$

Long Division

final Ans:
$2x - 5$

$x\,\boxed{2x} = 2x^2$

$x\,\boxed{-5} = -5x$

$$\begin{array}{r} 2x \quad -5 \\ x-1{\overline{\smash{\big)}\,2x^2 - 7x + 5}} \\ -(2x^2 - 2x \quad\quad) \\ \hline -5x \quad +5 \\ -(-5x \quad +5) \\ \hline \end{array}$$

Remainder $\rightarrow 0$

Ch.5 : Factoring

write it in product form

$15 = 3 \cdot 5$

$18x^2 = 2 \cdot 3 \cdot 3 \cdot x \cdot x$

$30x^3y^2 = 2 \cdot 3 \cdot 5 \cdot x \cdot x \cdot x \cdot y \cdot y$

$17 \rightarrow$ Prime

writing a polynomial in the form of product of other polynomial is called factoring.

Factor out GCF $\longrightarrow$ factor
$\longrightarrow$ Common
$\longrightarrow$ Greatest

$$15x - 6 = 3 \cdot 5 \cdot x - 2 \cdot 3$$
$$= 3(5x - 2)$$

GCF

to verify $\rightarrow$ Simply distribute

$$10x^2 - 25x = 2 \cdot 5 \cdot x \cdot x - 5 \cdot 5 \cdot x$$
$$= 5x(2x - 5)$$

GCF

$$28x^3y^4 - 49x^2y^3 + 14xy^5$$
$$= 2 \cdot 2 \cdot 7 \cdot x \cdot x \cdot x \cdot y \cdot y \cdot y \cdot y - 7 \cdot 7 \cdot x \cdot x \cdot y \cdot y \cdot y +$$
$$2 \cdot 7 \cdot x \cdot y \cdot y \cdot y \cdot y \cdot y$$
$$= 7xy^3(4x^2y - 7x + 2y^2)$$

$$4x(3x+2) - 5(3x+2)$$

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

when factoring 4 terms or more, we want to try Grouping.

$$2x^3 + 5x^2 + 6x + 15$$

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

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

Factor by grouping:

$$3x^3 - 10x^2 + 30x - 100$$

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

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

$$5x^3 + 7x^2 - 15x - 21$$

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

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

Factoring Trinomials in the form of

$$ax^2 + bx + c$$

Descending order

Ex: Factor

$$x^2 \boxed{+ 13x} + 36 = x^2 + 4x + 9x + 36$$

P = 36
S = 13

36

1, 36
2, 18
3, 12
$\boxed{4, 9}$
6, 6

$$= x(x+4) + 9(x+4)$$

$$= \boxed{(x+4)(x+9)}$$

we can verify
by Simply FOIL
Method.

Factor $x^2 + x - 30 = x^2 - 5x + 6x - 30$

P = -30
S = 1

-30

-1, 30
-2, 15
-3, 10
$\boxed{-5, 6}$

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

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

Factor $x^2 - 2x - 24 = x^2 + 4x - 6x - 24$

P = -24
S = -2

-24

1, -24
2, -12
3, -8
$\boxed{4, -6}$

$$= x(x+4) - 6(x+4)$$

$$= \boxed{(x+4)(x-6)}$$

Factor $x^2 - 13x + 40$

$P = 40$ $-1, -40$ $= x^2 -5x -8x + 40$

$S = -13$ $-2, -20$

$-4, -10$ $= x(x - 5) - 8(x - 5)$

$\boxed{-5, -8}$ $= (x - 5)(x - 8)$

$x^2 + 8x - 10 \rightarrow$ PRIME

$P = -10$ $-1, 10$ $\rightarrow$ No pair to give us

$S = 8$ $-2, 5$ $S = 8$

Factor $3x^2 + 11x + 8$

$P = 24$ List factors of $P = 24$

$S = 11$ $1, 24$ $= 3x^2 + 3x + 8x + 8$

$2, 12$

$\boxed{3, 8}$ $= 3x(x + 1) + 8(x + 1)$

$4, 6$ $= \boxed{(x + 1)(3x + 8)}$

Factor: $4x^2 + 5x - 9 = 4x^2 - 4x + 9x - 9$

$P = -36$

$S = 5$

List Factors

$-1, 36$ $= 4x(x-1) + 9(x-1)$

$-2, 18$

$-3, 12$ $= (x-1)(4x+9)$

$-4, 9$

$-6, 6$

Class Quiz

① Find Area

$A = LW$ $5x^7 - 4$

$5x^7 + 4$

② Divide $\dfrac{20x^6 - 16x^4 + 8x^2}{4x^4}$