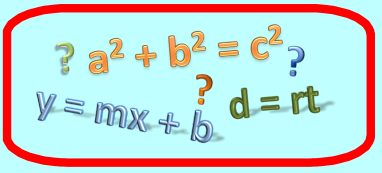
Math 115

Spring 2018

Lecture 19



Class Quiz (Box Your Final Ans.)

① Simplify : $3(2x+5y) - 5(x+3y)$

② $(-3x^2)^4 \cdot x^7$

③ $\dfrac{x^{10}y^8}{x^2y^7}$

④ $(2x+5)(2x-5)$

Special Product with binomials

① $(A+B)^2 = (A+B)(A+B)$

$= A^2 + AB + BA + B^2$

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

$= \boxed{A^2 + 2AB + B^2}$

ex: $(x+5)^2 = x^2 + 2(x)(5) + 5^2$

$= x^2 + 10x + 25$

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

$= \boxed{9x^2 + 24x + 16}$

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

$= 16x^4 + 8x^2y^3 + y^6$

Your turn:

① $(x+10)^2 = x^2 + 2(x)(10) + 10^2 = \boxed{x^2 + 20x + 100}$

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

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

$(x^m)^n = x^{m \cdot n}$

$= \boxed{16x^6 + 8x^5 + x^4}$

Special Product with binomials

② $(A-B)^2 = (A-B)(A-B)$

$= A^2 - AB - BA + B^2$

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

$= \boxed{A^2 - 2AB + B^2}$

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

$= \boxed{x^2 - 8x + 16}$

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

$= 25x^2 - 80x + 64$

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

$= \boxed{4x^{10} - 12x^5y^4 + 9y^8}$

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

$= 9x^{14} - 6x^{11} + x^8$

$(10x^6 - 7x^4)^2 = (10x^6)^2 - 2(10x^6)(7x^4) + (7x^4)^2$

$= 100x^{12} - 140x^6x^4 + 49x^8$

$= \boxed{100x^{12} - 140x^{10} + 49x^8}$

Special Product with binomials

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

Conjugates

$= A^2 - \cancel{AB} + \cancel{AB} - B^2$

$= A^2 - B^2$

Difference of two squares

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

Conjugates

Difference of two Sqrs

$= \boxed{x^2 - 36}$

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

Conjugates

Difference of two sqrs

$= 49x^6 - 25$

$(4x^8+9y^3)(4x^8-9y^3) = (4x^8)^2 - (9y^3)^2$

Conjugates

Difference of two sqrs

$= 16x^{16} - 81y^6$

$(12x^7 - 11x^5)(12x^7 + 11x^5) =$

Conjugates

$(12x^7)^2 - (11x^5)^2$

Difference of two Sqrs

$= 144x^{14} - 121x^{10}$

Simplify:

① $(7.8 \times 10^{13})(9.5 \times 10^{32})$

$= 74.1 \times 10^{45}$

$= 7.41 \times 10^{1} \times 10^{45}$

$= \boxed{7.41 \times 10^{46}}$

② $\dfrac{8.2 \times 10^{-12}}{4.1 \times 10^{15}}$

$= 2 \times 10^{-12-15} = \boxed{2 \times 10^{-27}}$

Use exponential rules to Simplify

① $x^{-6} = \boxed{\dfrac{1}{x^6}}$

② $(x^{-4})^5 = x^{-20} = \boxed{\dfrac{1}{x^{20}}}$

③ $\dfrac{x^{-3}y^{10}}{x^2 y^{-6}} = \dfrac{y^{10}y^6}{x^2x^3} = \boxed{\dfrac{y^{16}}{x^5}}$

④ $\left(\dfrac{3x^5}{2y^8}\right)^{-2} = \left(\dfrac{2y^8}{3x^5}\right)^{2} = \boxed{\dfrac{4y^{16}}{9x^{10}}}$

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

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

$= \frac{8x^6}{-125y^{12}}$

$= \boxed{\frac{-8x^6}{125y^{12}}}$

⑥ Give Degree & Coef. of each term:

$24xy^3 - 100x^6y^2 + xy - 400$

D = 1+3 = 4 | D = 6+2 = 8 | D = 1+1 = 2 | Constant D = 0

C = 24 | C = −100 | C = 1

D = 8

L.C. = −100

Polynomial / Monomial

$\frac{15x^2 - 10x}{5x} = \frac{15x^2}{5x} - \frac{10x}{5x}$

$= \boxed{3x - 2}$

$\frac{35x^7 - 14x^3 + 7x}{7x} = \frac{35x^7}{7x} - \frac{14x^3}{7x} + \frac{7x}{7x}$

$= \boxed{5x^6 - 2x^2 + 1}$

Divide: $\dfrac{45x^6 - 25x^4 + 10x^2}{-5x^2}$

$= \dfrac{45x^6}{-5x^2} - \dfrac{25x^4}{-5x^2} + \dfrac{10x^2}{-5x^2}$

$= \boxed{-9x^4 + 5x^2 - 2}$

Trinomial
D=4
L.C.=-9
Const.=-2

Polynomial / Binomial

Long Division

$\dfrac{x^2 - 8x + 15}{x - 3}$

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

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

$$\begin{array}{r|l} & x - 5 \\ \hline x-3 & x^2 - 8x + 15 \\ & -(x^2 - 3x) \\ \hline & -5x + 15 \\ & -(-5x + 15) \\ \hline & \text{Remainder} \rightarrow 0 \end{array}$$

$\boxed{x - 5}$

Divide: $\dfrac{x^3+5x^2-3x+10}{x+2}$

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

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

$x \cdot -9 = -9x$

$$x+2 \overline{)\, x^3+5x^2-3x+10}$$

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

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

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

$$-(3x^2+6x)$$

$$-9x+10$$

$$-(-9x-18)$$

Remainder $\rightarrow 28$

$$x^2+3x-9+\frac{28}{x+2}$$

Always

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

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

$x \cdot -x = -x^2$

$x \cdot -2 = -2x$

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

$$x^2-x-2$$

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

$$-x^2+0x+4$$

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

$$-2x+4$$

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

Remainder $\rightarrow 0$

$$x^2-x-2$$

Divide: $\dfrac{14x - 2 - 17x^2 + 6x^3}{2x - 3}$

$= \dfrac{6x^3 - 17x^2 + 14x - 2}{2x - 3}$

$2x \boxed{3x^2} = 6x^3$

$2x \boxed{-4x} = -8x^2$

$2x \boxed{1} = 2x$

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

$$\begin{array}{r} 3x^2 - 4x + 1 \\ 2x-3 \overline{)\,6x^3 - 17x^2 + 14x - 2} \\ -(6x^3 - 9x^2) \\ \hline -8x^2 + 14x - 2 \\ -(-8x^2 + 12x) \\ \hline 2x - 2 \\ -(2x - 3) \\ \hline \text{Rem.} \rightarrow 1 \end{array}$$