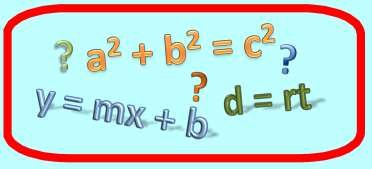
Math 115

Fall 2018

Lecture 18



Feb 19-8:47 AM

Special Products:

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

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

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

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

ex: $(x+3)^2 = (x)^2 + 2(x)(3) + (3)^2$

$= \boxed{x^2 + 6x + 9}$

ex: $(4x+5)^2 = (4x)^2 + 2(4x)(5) + (5)^2$

$= \boxed{16x^2 + 40x + 25}$

Nov 21-6:04 AM

ex: $(6x^2+7y^3)^2 = (6x^2)^2 + 2(6x^2)(7y^3) + (7y^3)^2$

$= 36x^4 + 84x^2y^3 + 49y^6$

ex: $(8x^3+5x^2)^2 = (8x^3)^2 + 2(8x^3)(5x^2) + (5x^2)^2$

$= 64x^6 + 80x^5 + 25x^4$

Nov 21-6:09 AM

Special Products:

② $(A-B)^2 = (A-B)(A-B)$

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

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

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

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

$= x^2 - 8x + 16$

ex: $(7x-10)^2 = (7x)^2 - 2(7x)(10) + (10)^2$

$= 49x^2 - 140x + 100$

Nov 21-6:04 AM

ex: $(8x^5 - 11y^4)^2 = (8x^5)^2 - 2(8x^5)(11y^4) + (11y^4)^2$

$= 64x^{10} - 176x^5y^4 + 121y^8$

ex: $(12x^7 - 5x^3)^2 = (12x^7)^2 - 2(12x^7)(5x^3) + (5x^3)^2$

$= 144x^{14} - 120x^{10} + 25x^6$

Nov 21-6:20 AM

Special Products:

③ $(A+B)(A-B) = A^2 - AB + BA - B^2$

Conjugates

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

$= A^2 - B^2$

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

$= x^2 - 25$

ex: $(6x-1)(6x+1) = (6x)^2 - (1)^2$

Conjugates

$= 36x^2 - 1$

Nov 21-6:04 AM

ex: $(3x^5 - 10y^2)(3x^5 + 10y^2)$

Conjugates

$= (3x^5)^2 - (10y^2)^2 = \boxed{9x^{10} - 100y^4}$

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

Conjugates

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

Conjugates

$= \boxed{x^4 - 16}$

Nov 21-6:33 AM

Division of Polynomial by Monomial:

$$\frac{A + B - C}{D} = \frac{A}{D} + \frac{B}{D} - \frac{C}{D}$$

$$\frac{12x^3 - 10x^2 + 6x}{2x} = \frac{6}{\cancel{12}x^{\cancel{3}}} - \frac{5}{\cancel{10}x^{\cancel{2}}} + \frac{3}{\cancel{6}x}$$

$$= 6x^2 - 5x^1 + 3$$

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

Nov 21-6:38 AM

ex: Divide $\dfrac{35x^6 + 14x^4 - 7x^2}{7x^2}$

Monomial

$= \dfrac{\cancel{35}^{5}x^6}{\cancel{7}x^2} + \dfrac{\cancel{14}^{2}x^4}{\cancel{7}x^2} - \dfrac{7x^2}{7x^2}$

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

Trinomial, D=4, L.C.=5, Constant =-1

Nov 21-6:42 AM

ex: Divide: $\dfrac{50x^6y^4 - 25x^4y^3 + 5x^2y^2}{-5x^2y^2}$

$= \dfrac{\cancel{50}x^6y^4}{\cancel{-5}x^2y^2} - \dfrac{25x^4y^3}{-5x^2y^2} + \dfrac{5x^2y^2}{-5x^2y^2}$

D=4+2=6 D=2+1=3

$= -10x^4y^2 + 5x^2y - 1$

D=0

Trinomial, D=4+2=6

L.C.=-10, Const. -1

Nov 21-6:46 AM

Dividing Polynomial by binomial (Long Division)

$$\frac{3x^2 - 8x + 5}{x - 1}$$

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

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

$$\begin{array}{r} 3x \quad -5 \\ x-1 \overline{)\,3x^2 - 8x + 5} \\ -(3x^2 - 3x \quad \downarrow) \\ \hline -5x + 5 \\ -(-5x + 5) \\ \hline \text{Remainder} \rightarrow 0 \end{array}$$

Final Ans: $3x - 5$

Nov 21-6:53 AM

Divide. $\dfrac{4x^3 - 3x^2 + 6x - 10}{x + 2}$

$$\begin{array}{r} 4x^2 \quad -11x \quad +28 \\ x+2 \overline{)\,4x^3 - 3x^2 + 6x - 10} \\ -(4x^3 + 8x \quad \downarrow \quad \downarrow) \\ \hline -11x^2 + 6x - 10 \\ -(-11x^2 - 22x \quad \downarrow) \\ \hline 28x - 10 \\ -(28x + 56) \\ \hline \rightarrow -66 \end{array}$$

$x \boxed{4x^2} = 4x^3$

$x \boxed{-11x} = -11x^2$

$x \boxed{28} = 28x$

Final Ans:

$$4x^2 - 11x + 28 + \frac{-66}{x+2}$$

Always

Remainder

Denominator

Nov 21-7:00 AM

Divide: $\frac{x^3 - 10x^2 + 40}{x-3}$ Numerator has a missing term

$$x-3 \;\big|\; x^3 - 10x^2 + 0x + 40$$

$$x^2 - 7x - 21$$

$$-(x^3 - 3x^2 \quad \downarrow \quad \downarrow)$$

$$-7x^2 + 0x + 40$$

$$-(-7x^2 + 21x \quad \downarrow)$$

$$-21x + 40$$

$$-(-21x + 63)$$

Rem. $\rightarrow -23$

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

$x \boxed{-7x} = -7x^2$

$x \boxed{-21} = -21x$

Always

Final Ans: $x^2 - 7x - 21 + \frac{-23}{x-3}$

Nov 21-7:09 AM

Divide: $\frac{2x^3 - 21 - 14x + 3x^2}{2x+3}$

$$2x+3 \;\big|\; 2x^3 + 3x^2 - 14x - 21$$

$$x^2 \qquad -7$$

$$-(2x^3 + 3x^2 \quad \downarrow \quad \downarrow)$$

$$-14x - 21$$

$$-(-14x - 21)$$

Rem. $\rightarrow 0$

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

$2x \boxed{-7} = -14x$

Final Ans $x^2 - 7$

Nov 21-7:16 AM