

LESSON #3: DIVIDING POLYNOMIALS (DAY 2)

Do Now: - Use the long division to determine the quotient:

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

*HINT: There is a term missing that needs to be accounted for! *

$$\begin{array}{r}
 \overline{) 2x^3 - 4x^2 + 0x + 2} \\
 \underline{-(2x^3 + 2x^2)} \\
 -2x^2 + 0x \\
 \underline{+(12x^2 + 2x)} \\
 -2x + 2 \\
 \underline{+(7x + 2)} \\
 0
 \end{array}$$

* change to easier problem

$$\begin{array}{r}
 \overline{) x^2 + 14x + 40} \\
 \underline{-(x^2 + 10x)} \\
 4x + 40 \\
 \underline{-(4x + 40)} \\
 0
 \end{array}$$

1) $\frac{2x^3 - 4x^2 + 2}{2x - 2}$ (DO NOW)

$$2x - 2$$

2) $\frac{x^5 - 1}{x - 1}$

$$\begin{array}{r}
 \overline{) x^4 + x^3 + x^2 + x + 1} \\
 \underline{-(x^4 + x^3)} \\
 0x^3 + 0x^2 + 0x + 1 \\
 \underline{-(0x^3 + 0x^2 + 0x + 1)} \\
 0
 \end{array}$$

*Don't forget to fill in the zero terms if needed!

PRACTICE: Simplify

3) $(x^3 - 27) \div (x - 3)$

$$\begin{array}{r}
 \boxed{x^2 + 3x + 9} \\
 x-3 \overline{) x^3 + 0x^2 + 0x - 27} \\
 \underline{-x^3 + 3x^2} \quad \downarrow \\
 3x^2 + 0x \\
 \underline{-3x^2 + 9x} \quad \downarrow \\
 9x - 27 \\
 \underline{-9x + 27} \\
 0
 \end{array}$$

4) $(x^3 - 8) \div (x - 2)$

$$\begin{array}{r}
 \boxed{x^2 + 2x + 4} \\
 x-2 \overline{) x^3 + 0x^2 + 0x - 8} \\
 \underline{-x^3 + 2x^2} \quad \downarrow \\
 2x^2 + 0x \\
 \underline{-2x^2 + 4x} \quad \downarrow \\
 4x - 8 \\
 \underline{-4x + 8} \\
 0
 \end{array}$$

5) $(x^4 + 18x^3 + 71x^2 - 258x - 1512) \div (x - 4)$

$$\begin{array}{r}
 \boxed{x^3 + 22x^2 + 159x + 378} \\
 x-4 \overline{) x^4 + 18x^3 + 71x^2 - 258x - 1512} \\
 \underline{-x^4 + 4x^3} \quad \downarrow \\
 22x^3 + 71x^2 \\
 \underline{-22x^3 + 88x^2} \quad \downarrow \\
 159x^2 - 258x \\
 \underline{-159x^2 + 636x} \quad \downarrow \\
 378x - 1512 \\
 \underline{-378x + 1512} \\
 0
 \end{array}$$

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

conjugates!

$(x^2 - 9) - (x^2 - 16)$
 $x^2 - 9 - x^2 + 16$

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LAB #2

Find the quotient.

1) $(x^2 + 7x + 12) \div (x + 3)$

$$\begin{array}{r} \boxed{x + 4} \\ x+3 \overline{) x^2 + 7x + 12} \\ \underline{-x^2 + 3x} \downarrow \\ 4x + 12 \\ \underline{-4x + 12} \\ 0 \end{array}$$

2) $\frac{3x^3 + 4x^2 + 7x + 22}{x + 2}$

$$\begin{array}{r} \boxed{x+2} \\ x+2 \overline{) 3x^3 + 4x^2 + 7x + 22} \\ \underline{-3x^3 + 6x^2} \downarrow \\ -2x^2 + 7x \\ \underline{+2x^2 + 4x} \downarrow \\ 11x + 22 \\ \underline{-11x + 22} \\ 0 \end{array}$$

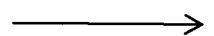
omg!

3) Multiply $(x + 2)(3x^2 - 2x + 11)$

	$3x^2 - 2x + 11$		
x	$3x^3$	$-2x^2$	$+11x$
$+2$	$+6x^2$	$-4x$	$+22$
	$\boxed{3x^3 + 4x^2 + 7x + 22}$		

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

$$\begin{aligned} & (x-2)(x-2) \\ & x^2 - 2x - 2x + 4 \\ & x^2 - 4x + 4 - (x+4) + x(x-1) \\ & x^2 - 4x + 4 - x - 4 + x^2 - x \\ & \underline{ - 4x + 4} \quad \underline{ - x - 4} \quad \underline{ + x^2 - x} \\ & \boxed{2x^2 - 6x} \end{aligned}$$



$$5) \frac{(x^2+5x+20)+(x^2+6x-6)}{x+2}$$

$$\begin{array}{r} \boxed{2x+7} \\ x+2 \overline{) 2x^2+11x+14} \\ \underline{-2x^2-4x} \quad \downarrow \\ 7x+14 \\ \underline{-7x-14} \\ 0 \end{array}$$

(Hint: Simplify the numerator 1st!)

Use long division to determine the quotient.

$$1. \frac{x^3-1}{x-1}$$

$$\begin{array}{r} x-1 \overline{) x^3+0x^2+0x-1} \\ \underline{-x^3+1x^2} \quad \downarrow \\ x^2+0x \\ \underline{-x^2+x} \quad \downarrow \\ x-1 \\ \underline{-x+1} \\ 0 \end{array}$$

$$2. x+3 \overline{) x^3+5x^2+7x+3}$$

$$\begin{array}{r} \boxed{x^2+2x+1} \\ x+3 \overline{) x^3+5x^2+7x+3} \\ \underline{-x^3-3x^2} \quad \downarrow \\ 2x^2+7x \\ \underline{-2x^2-6x} \quad \downarrow \\ x+3 \\ \underline{-x-3} \\ 0 \end{array}$$

$$3. \frac{(x-2)^3}{x-2}$$

Numerator 1st!

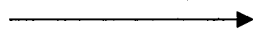
$$\begin{array}{r} \boxed{x^2-4x-4} \\ x-2 \overline{) x^3-6x^2+12x-8} \\ \underline{-x^3+2x^2} \quad \downarrow \\ -4x^2+12x \\ \underline{+4x^2-8x} \quad \downarrow \\ 4x-8 \end{array}$$

$$(x-2)(x-2)(x-2)$$

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

$$\begin{array}{r} x \quad \boxed{x^3-4x^2+4x} \\ -2 \quad \boxed{2x^2-8x-8} \end{array}$$

$$x^3-6x^2+12x-8$$



4. Multiply and state your answer in standard form.

$$(11 - 15x - 7x^2)(25 - 16x^2)$$

	$-7x^2$	$-15x$	$+11$
$-16x^2$	$112x^4$	$240x^3$	$-176x^2$
25	$-175x^2$	$-375x$	275

$$112x^4 + 240x^3 - 351x^2 - 375x + 275$$

5. $(x+7)(2x-3) - (x^3 - 2x^2 + x - 2) \div (x-2)$ (HINT: Remember to follow PEMDAS!)

$$2x^2 - 3x + 14x - 21$$

$$2x^2 + 11x - 21$$

$$\begin{array}{r}
 x^2 + 0x + 1 \\
 x-2 \overline{) x^3 - 2x^2 + x - 2} \\
 \underline{-x^3 + 2x^2} \\
 0x^2 + x \\
 \underline{-0x^2 + 0x} \\
 x - 2 \\
 \underline{-x + 2} \\
 0
 \end{array}$$

$$x^2 + 0x + 1$$

$$2x^2 + 11x - 21 - (x^2 + 1)$$

$$\underline{2x^2 + 11x - 21} - \underline{x^2 - 1}$$

$$\boxed{x^2 + 11x - 22}$$

