

Today we learned how to divide polynomials using long division. Below are the notes and practice problems completed in class. As well as the homework assignment.

$$(8n^3 - 12n^2 + 3n + 1) \div (n - 1)$$

$$\begin{array}{r} 8n^2 - 4n - 1 \\ n-1 \overline{) 8n^3 - 12n^2 + 3n + 1} \\ \underline{8n^3 + 8n^2} \\ -4n^2 + 3n \\ \underline{+ 4n^2 - 4n} \\ -1n + 1 \\ \underline{+ 1n - 1} \\ 0 \end{array}$$

$\frac{8n^3}{n} = 8n^2$
 $\frac{-4n^2}{n} = -4n$
 $\frac{-1n}{n} = -1$

$$8n^2 - 4n - 1$$

Include all degrees

$$(9m^3 + 72m^2 - 9) \div (m + 8)$$

$$\begin{array}{r} 9m^2 + 0m + 0 - \frac{9}{m+8} \\ m+8 \overline{) 9m^3 + 72m^2 + 0m - 9} \\ \underline{9m^3 + 72m^2} \\ 0m + 0m \\ \underline{- 0m + 0m} \\ 0m - 9 \\ \underline{- 0m + 0} \\ -9 \end{array}$$

$\frac{9m^3}{m} = 9m^2$

How to write a remainder

add in missing term with a 0

$$9m^2 - \frac{9}{m+8}$$

1, 8, 12

HW
2, 3, 13, 15

Step 1.

Polynomial Division: Long Division

Divide.

1) $(x^3 - x^2 - 33x - 15) \div (x + 5)$

$$\begin{array}{r} x^2 - 6x - 3 \\ x+5 \overline{) x^3 - x^2 - 33x - 15} \\ \underline{-x^3 + 5x^2} \\ -6x^2 - 33x \\ \underline{+6x^2 + 30x} \\ -3x - 15 \\ \underline{+3x + 15} \\ 0 \end{array}$$

$x^2 - 6x - 3$

2) $(4x^3 - 19x^2 + 13x + 24) \div (x - 3)$

$$\begin{array}{r} 4x^2 - 7x - 8 \\ x-3 \overline{) 4x^3 - 19x^2 + 13x + 24} \\ \underline{-4x^3 + 12x^2} \\ -7x^2 + 13x \\ \underline{+7x^2 - 21x} \\ -8x + 24 \\ \underline{+8x - 24} \\ 0 \end{array}$$

$4x^2 - 7x - 8$

3) $(5x^3 - 43x^2 + 48x + 63) \div (x - 7)$

$$\begin{array}{r} 5x^2 - 8x - 9 \\ x-7 \overline{) 5x^3 - 43x^2 + 48x + 63} \\ \underline{-5x^3 + 35x^2} \\ -8x^2 + 48x \\ \underline{+8x^2 - 56x} \\ -8x + 63 \\ \underline{+8x - 56} \\ 7 \end{array}$$

$5x^2 - 8x - 9 + \frac{7}{x-7}$

4) $(a^3 - 5a^2 - 22a + 59) \div (a - 7)$

5) $(x^3 + 12x^2 + 26x + 66) \div (x + 10)$

6) $(4a^3 - 15a^2 + 20a - 4) \div (a - 2)$

7) $(p^3 - 10p^2 + 28p - 33) \div (p - 6)$

8) $(r^3 + r^2 - 3r + 1) \div (r + 3)$

$$\begin{array}{r} r^2 - 2r + 3 - \frac{8}{r+3} \\ r+3 \overline{) r^3 + r^2 - 3r + 1} \\ \underline{-r^3 + 3r^2} \\ 2r^2 - 3r \\ \underline{+2r^2 + 6r} \\ 3r + 1 \\ \underline{-3r - 9} \\ -8 \end{array}$$

$r^2 - 2r + 3 - \frac{8}{r+3}$

9) $(a^3 + 4a^2 - 5) \div (a + 4)$

10) $(v^3 + 10v^2 - 9) \div (v + 10)$

11) $(3x^3 - 7x^2 + 3x + 5) \div (x - 2)$

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

$3 \overline{) \frac{5}{2}}$
 $\frac{1}{3} \overline{) \frac{a^3}{a}}$

12) $(a^3 - 25a - 5) \div (a + 5)$

$$\begin{array}{r} a^2 - 5a + 0 - \frac{5}{a+5} \\ a+5 \overline{) a^3 - 0a^2 - 25a - 5} \\ \underline{a^3 + 5a^2} \\ -5a^2 - 25a - 5 \\ \underline{-5a^2 - 25a} \\ +5a^2 + 25a - 5 \\ \underline{+5a^2 + 25a} \\ 0a - 5 \\ \underline{-0a - 5} \\ -5 \end{array}$$

13) $(x^5 + 6x^4 - 8x^2 - 47x + 9) \div (x + 6)$

$$\begin{array}{r} x^4 + 0x^3 - 8x + 1 + \frac{3}{x+6} \\ x+6 \overline{) x^5 + 6x^4 - 8x^2 - 47x + 9} \\ \underline{x^5 + 6x^4} \\ 0x^3 - 8x^2 - 47x + 9 \\ \underline{0x^3 + 6x^2} \\ -8x^2 - 47x + 9 \\ \underline{-8x^2 - 48x} \\ +x + 9 \\ \underline{+x + 6} \\ 3 \end{array}$$

$x^2 - 8x + 1 + \frac{3}{x+6}$

14) $(4x^5 + 40x^4 + 2x + 11) \div (x + 10)$

15) $(n^4 - 15n^3 + 61n^2 - 35n - 39) \div (n - 8)$

16) $(r^4 + r^3 - 20r^2 + 19r + 12) \div (r - 3)$

$\frac{n^4}{n} = n^3$
 $\frac{0}{n} = 0$
 $\frac{-8x^2}{x} = -8x$
 $\frac{x}{x} = 1$

$$\begin{array}{r} n^3 - 7n^2 + 5n + 5 + \frac{1}{n-8} \\ n-8 \overline{) n^4 - 15n^3 + 61n^2 - 35n - 39} \\ \underline{n^4 - 8n^3} \\ -7n^3 + 61n^2 - 35n - 39 \\ \underline{-7n^3 + 56n^2} \\ 5n^2 - 35n - 39 \\ \underline{5n^2 - 40n} \\ 5n - 39 \\ \underline{5n - 40} \\ -5n + 40 \end{array}$$

- ① divide first terms
- ② multiply distribute top number
- ③ subtract product
- ④ bring down

17) $(n^4 - 25n^2 - 4n - 11) \div (n + 5)$

18) $(b^4 - 17b^3 + 81b^2 - 67b - 30) \div (b - 8)$

19) $(5x^4 - 49x^3 + 81x^2 - 79x + 63) \div (x - 8)$

20) $(k^4 + 2k^3 - 4k - 18) \div (k + 2)$