

Chapter 6.5

Alg II - honors
May 19, 2011

Polynomial Long Division

Regular Division:

$$137 \div 22 \qquad \frac{137}{22} \qquad 137 \cdot 22^{-1}$$

(all the same thing)

$$6.22 + \frac{16}{22}$$

(times by -1 or "subtract")

16 (remainder)

= (Answer) $6.22 + \frac{16}{22}$

(polynomial)
If I have a function $f(x)$
Divided by a Divisor $d(x)$
you get a quotient $q(x)$
and a remainder $r(x)$

$$\frac{f(x)}{d(x)} = q(x) + \frac{r(x)}{d(x)}$$

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

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

- $(x^2 + 7x - 5)(x - 2)^{-1}$

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

$$\begin{array}{r}
 x+9 \\
 \hline
 x-2 \mid x^2 + 7x - 5 \\
 \text{(times by -1)} \rightarrow \underline{-x^2 + 2x} \downarrow \\
 9x - 5 \\
 \text{(-1)} \underline{-9x + 18} \\
 13
 \end{array}$$

Answer: $\frac{x+9}{x-2} + \frac{13}{x-2}$

↑ quotient

↗ remainder

example:

$$\begin{array}{r}
 2x^2 + 7x + 10 \\
 \hline
 x^2 - 2x + 2 \mid 2x^4 + 3x^3 + 0x^2 + 5x - 1 \\
 \text{(-1)} \rightarrow \underline{-2x^4 + 4x^3 + 4x^2} \downarrow \\
 7x^3 - 4x^2 + 5x \\
 \text{(-1)} \underline{-7x^3 + 14x^2 + 14x} \downarrow \\
 10x^2 - 9x - 1 \\
 \text{(-1)} \underline{-10x^2 + 20x + 20} \\
 11x - 21
 \end{array}$$

Answer: $2x^2 + 7x + 10 + \frac{11x - 21}{x^2 - 2x + 2}$

Synthetic Division

5/19/11

$$\begin{array}{r}
 x+5 \\
 \hline
 2x^2 - 3x + 1
 \end{array}$$

-k

k = -5 2 -3 1

$$\begin{array}{r}
 -5 \mid \begin{array}{r} -10 \quad 65 \\ 2 \quad -3 \quad 1 \end{array} \\
 \downarrow \quad \swarrow \quad \downarrow \quad \swarrow \quad \downarrow \\
 2 \quad -13 \quad 66
 \end{array}$$

$2x - 13 + 66$

Finding Rational Zeros

Alg II

May 25, 20

$$f(x) = x^3 - 7x + 6$$

$$\frac{P}{Q} = \frac{\text{(All factors of constant term)}}{\text{(All factors of the 1st term)}}$$

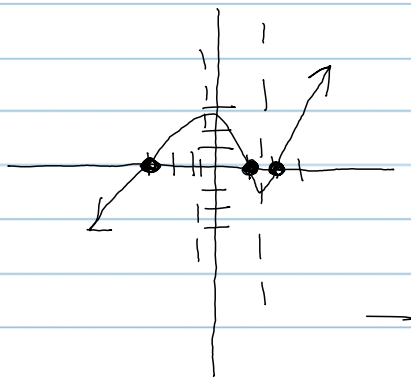
what are the factors for $p = \frac{\pm 1 \pm 2 \pm 3 \pm 6}{\pm 1}$

Test: $\pm 1 \pm 2 \pm 3 \pm 6$

$$\begin{array}{r|rrrr} 1 & 1 & 0 & -7 & 6 \\ & & 1 & 1 & -6 \\ \hline & 1 & 1 & -6 & 0 \end{array}$$

$$\begin{aligned} x &= 1 \\ x &= -3 \\ x &= 2 \end{aligned}$$

$$\begin{aligned} (x-1)(x^2+x-6) \\ (x-1)(x+3)(x-2) \end{aligned}$$



$$f(x) = 2x^3 + 2x^2 - 8x - 8$$

Test: $\pm 1 \pm 2 \pm 4 \pm 8$
 $\pm \frac{1}{2}$

$$\frac{p}{q} = \frac{\pm 1 \pm 2 \pm 4 \pm 8}{\pm 1 \pm 2}$$