

Feb. 15, 2017

Sect. 3-6b

Polynomial Division

Synthetic Division

$$(x^2 + 5x + 6) \div (x + 2)$$

-2	1	5	6
	↓	-2	-6
	1	3	0

$x + 3$

$x + 3$

$$\frac{3x^3 - 7x^2 + 9x - 14}{x - 2}$$

$$\begin{array}{r|rrrr} 2 & 3 & -7 & 9 & -14 \\ & \downarrow & 6 & -2 & 14 \\ \hline & 3 & -1 & 7 & 0 \end{array}$$

$3x^2 - 1x + 7$

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

$$\begin{array}{r|rrrr} -3 & 2 & 2 & 0 & -7 \\ & \downarrow & & & \\ & & -6 & 12 & -36 \\ \hline & 2 & -4 & 12 & -43 \end{array}$$

$$2x^2 - 4x + 12 + \frac{-43}{x+3}$$

$$\frac{(2x^2 + 5x - 6)}{2} \div \frac{(2x + 1)}{2}$$

$$(x^2 + \frac{5}{2}x - 3) \div (x + \frac{1}{2})$$

$$\begin{array}{r|l} -\frac{1}{2} & 1 \quad \frac{5}{2} \quad -3 \\ & \downarrow \quad -\frac{1}{2} \quad -1 \\ \hline & 1 \quad 2 \quad -4 \\ & |x + 2 + \frac{-4}{2x+1} \end{array}$$

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

Can't use Synth. Div.

Must use Long Div.

## Remainder Theorem

$$\frac{f(x)}{x-a} = Q(x) + \frac{R}{x-a}$$

$$f(a) = R$$

r'

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

$$\begin{array}{r|rrrr} -3 & 2 & 2 & 0 & -7 \\ & \downarrow & & & \\ & & -6 & 12 & -36 \\ \hline & 2 & -4 & 12 & -43 \end{array}$$

$$2x^2 - 4x + 12 + \frac{-43}{x+3}$$



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

Find  $f(-3)$

$$f(-3) = 2(-3)^3 + 2(-3)^2 - 7$$

$$= 2(-27) + 2(9) - 7$$

$$= -54 + 18 - 7$$

$$= -43$$