Mar. 19, 2018

Sect. 6-7 b

Synthetic Division

Remainder Theorem

Limitations

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

$$\begin{array}{r|rrr}
-2 & 1 & 5 & 6 \\
+ & \downarrow & -2 & -6 \\
\hline
 & 1 & 3 & 0
\end{array}$$

$$1x^1+3 = x+3$$

$$(3x^3 - 7x^2 + 9x - 14) \div (x - 2)$$

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

$$3x^2 - 1x + 7$$

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

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

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

$$(3x^4 + 2x^2 - 1) \div (x - 2)$$

$$\begin{array}{r|rrrr|r}
2 & 3 & 0 & 2 & 0 & -1 \\
 & +\downarrow & 6 & 12 & 28 & 56 \\
\hline
 & 3 & 6 & 14 & 28 & 55
\end{array}$$

$$3x^3 + 6x^2 + 14x + 28 + \frac{55}{x-2}$$

$f(x) = 3x^4 + 2x^2 - 1$

Find $f(2)$

$$f(2) = 3(2)^4 + 2(2)^2 - 1$$
$$= 3(16) + 2(4) - 1$$
$$= 48 + 8 - 1$$
$$= 56 - 1$$
$$= 55$$

The answer for $f(2)$
is the same as when
we run 2 through synth.

This is called the
Remainder Theorem

Limitations

$$\underbrace{(2x^2+5x-6)}_{2} \div \underbrace{(\boxed{2}x+1)}_{2}$$

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

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

$$x+2+\frac{-4}{x+\frac{1}{2}} = x+2+\frac{-8}{2x+1}$$

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

Can't do with synthetic.

Must use long division.