

Chapter 2  
Section 3

# Synthetic Division

## LONG DIVISION

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$$\begin{array}{r} 4x+5 \\ \hline 4x(x-2) \end{array}$$

• 1.  $x-2 \overline{)4x^2 - 3x + 8}$

$$\begin{array}{r} + (4x^2 + 8x) \\ \hline 5x + 8 \end{array}$$

$$\begin{array}{r} + (-5x^2 - 10x) \\ \hline 18 \end{array}$$

$$4x+5 + \frac{18}{x-2}$$

$$\begin{array}{r} 6x-16 + \frac{52}{x+4} \\ 2. \quad x+4 \overline{)6x^2 + 8x - 12} \\ + (-6x^2 - 24x) \\ \hline -16x - 12 \\ + (-16x - 64) \\ \hline 52 \end{array}$$

## Synthetic Division

• 1.  $x - 2 \overline{)4x^2 - 3x + 8}$       2.  $x + 4 \overline{)6x^2 + 8x - 12}$

$$\begin{array}{r|rrr} 2 & 4 & -3 & 8 \\ & \downarrow & 8 & 10 \\ \hline & 4 & 5 & 18 \end{array}$$

$4x^2 + 5x + \frac{18}{x-2}$

$$\begin{array}{r|rrr} -4 & 6 & 8 & -12 \\ & \downarrow & -24 & 64 \\ \hline & 6 & -16 & 52 \end{array}$$

$6x^2 - 16x + 52 \over x+4$

## SD- continued

• 3.  $5x^3 + 8x^2 - x + 6 \div x + 2$     4.  $x^4 - 10x^2 - 2 \div x + 3$

$$\begin{array}{r} 5 \ 8 \ -1 \ 6 \\ \downarrow -10 \ 4 \ -6 \\ \hline 5 \ -2 \ 3 \ 0 \end{array}$$

$$5x^2 - 2x + 3$$

$$\begin{array}{r} 1 \ 0 \ -10 \ 0 \ -2 \\ \downarrow -3 \ 9 \ 3 \ -9 \\ \hline 1 \ -3 \ -1 \ 3 \ -11 \end{array}$$

$$x^3 - 3x^2 - x + 3 - \frac{11}{x+3}$$

## SD- continued

• 5.  ~~$x^2 + 3x + 5 \div x - 1$~~

6.  $2x^3 - 4x^2 - 5x + 8 \div 3x + 6$

$$\begin{array}{r} 2 - 4 - 5 \ 8 \\ \downarrow -4 \ 16 -22 \\ 2 - 8 \ 11 \boxed{-14} \\ 2x^2 - 8x + 11 - \frac{14}{3x+6} \end{array}$$

## Two Theorems

- **REMAINDER THEOREM:**
  - If a polynomial function is divided by  $(x - k)$ , then the remainder is  $r = f(k)$
- **FACTOR THEOREM:**
  - A polynomial function has a factor  $(x - k)$  if and only if  $f(k) = 0$

## Classwork

- Pg 159 # 6, 19, 32

# HMWK

- Pg 89 # 12, 32, 33
- Pg 159 # 5, 10, 20-30 even