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What you'll Learn About

Divide  $f(x)$  by  $d(x)$  using factoring.

1)  $f(x) = x^2 + 5x + 6$        $d(x) = x + 2$

$$\frac{f(x)}{d(x)} = \frac{x^2 + 5x + 6}{x + 2} = \frac{(x + 3)(x + 2)}{x + 2} = x + 3$$

Divide  $f(x)$  by  $d(x)$  using long division.

2)  $f(x) = x^2 + 5x + 6$        $d(x) = x + 2$

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

Divide  $f(x)$  by  $d(x)$  using synthetic division.

3)  $f(x) = x^2 + 5x + 6$        $d(x) = x + 2$

$$\begin{aligned} x + 2 &= 0 \\ x &= -2 \end{aligned}$$

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

[0] Remainder

$x + 3$

$$\frac{75}{3} = 25 \text{ R } 0$$

$$\begin{array}{r} 25 \phantom{0} \\ 3 \overline{) 75 \phantom{0}} \\ \underline{75} \phantom{0} \\ 0 \end{array}$$

Remainder

$$\frac{f(x)}{d(x)} = x^2 - \frac{7}{3}x + \frac{38}{9} + \frac{-139/9}{3x+2} = x^2 - \frac{7}{3}x + \frac{38}{9} - \frac{139}{9(3x+2)}$$

Divide  $f(x)$  by  $d(x)$  by using long division, and write a summary statement in polynomial form and fraction form.

1)  $f(x) = 3x^3 + 5x^2 + 8x + 7$   $d(x) = 3x + 2$

$f(x) = 3x^3 - 5x^2 + 8x - 7$

$$\begin{array}{r} x^2 - \frac{7}{3}x + \frac{38}{9} \\ 3x+2 \overline{) 3x^3 - 5x^2 + 8x - 7} \\ \underline{3x^3 + 2x^2} \phantom{- 7} \\ -7x^2 + 8x - 7 \\ \underline{+7x^2 + \frac{14}{3}x} \phantom{- 7} \\ \frac{38}{3}x - 7 \phantom{- 7} \\ \underline{-\frac{38}{3}x + \frac{76}{9}} \\ -\frac{139}{9} \end{array}$$

Remainder  $-\frac{139}{9}$

$\frac{f(x)}{d(x)}$

$\frac{3(\text{what})}{3} = \frac{-7}{3}$   
 what =  $-\frac{7}{3}$

$\frac{(\frac{38}{3})}{(3)} = \frac{38}{3} \cdot \frac{1}{3}$   
 $\downarrow \frac{38}{3} \div 3$

Divide  $f(x)$  by  $d(x)$  by using synthetic division, and write a summary statement in polynomial form and fraction form.

2)  $f(x) = 3x^3 + 5x^2 + 8x + 7$   $d(x) = 3x + 2$  Linear  $3x + 2 = 0$   
 $x = -\frac{2}{3}$

$f(x) = 3x^3 - 5x^2 + 8x - 7$

$-\frac{2}{3} \cdot \frac{3}{1} = -2$

$-\frac{2}{3} \cdot -\frac{7}{1} = \frac{14}{3}$

$-\frac{2}{3} \cdot \frac{38}{3}$

$$\begin{array}{r|rrrr} -\frac{2}{3} & 3 & -5 & 8 & -7 \\ & & -2 & +\frac{14}{3} & -\frac{76}{9} \\ \hline & 3 & -7 & \frac{38}{3} & -\frac{139}{9} \end{array}$$

$\frac{3x^2}{3} - \frac{7x}{3} + \frac{38}{3} - \frac{139/9}{(3x+2)}$

$$x^2 - \frac{7}{3}x + \frac{38}{9} - \frac{139}{9(3x+2)}$$