

# Honors Math 3 - Long Division (evens)

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

$$\begin{array}{r} x^2 + 0x + 3 \\ x-3 \overline{) x^3 - 3x^2 + 3x - 9} \\ \underline{-x^3 + 3x^2} \phantom{-9} \\ 0x^2 + 3x \phantom{-9} \\ \underline{-0x^2 + 0x} \phantom{-9} \\ 3x - 9 \\ \underline{-3x + 9} \\ 0 \end{array}$$

$$\boxed{x^2 + 3}$$

to check:  
 $(x-3)(x^2+3)$   
Div  $\cdot$  Quo  
 $x^3 + 3x - 3x^2 - 9$   $\checkmark$  Dividend

④  $(5x^3 - 11x^2 - 14x - 10) \div (x - 3)$

$$\begin{array}{r} 5x^2 + 4x - 2 \\ x-3 \overline{) 5x^3 - 11x^2 - 14x - 10} \\ \underline{-5x^3 + 15x^2} \phantom{-10} \\ 4x^2 - 14x \phantom{-10} \\ \underline{-4x^2 + 12x} \phantom{-10} \\ -2x - 10 \\ \underline{+2x + 6} \\ -16 \end{array}$$

$$\boxed{5x^2 + 4x - 2 - \frac{16}{x-3}}$$

$$(3x^3 - 17x^2 + 13x + 4) \div (3x - 2)$$

$$\begin{array}{r}
 3x-2 \overline{) 3x^3 - 17x^2 + 13x + 4} \\
 \underline{- 3x^3 + 2x^2} \phantom{+ 4} \\
 -15x^2 + 13x \phantom{+ 4} \\
 \underline{+ 15x^2 - 10x} \phantom{+ 4} \\
 3x + 4 \\
 \underline{- 3x + 2} \\
 6
 \end{array}$$

$$x^2 - 5x + 1 + \frac{6}{3x-2}$$

$$\textcircled{8} (2x^3 + 5x^2 - 4x - 5) \div (x + \frac{1}{2})$$

$$\begin{array}{r}
 2x^2 + 4x - 6 \\
 1x + \frac{1}{2} \overline{) 2x^3 + 5x^2 - 4x - 5} \\
 \underline{- 2x^3 + x^2} \phantom{- 4x - 5} \\
 4x^2 - 4x \phantom{- 5} \\
 \underline{- 4x^2 + 2x} \phantom{- 5} \\
 -6x - 5 \\
 \underline{+ 6x + 3} \\
 -2
 \end{array}$$

$$2x^2 + 4x - 6 - \left(\frac{2}{x + \frac{1}{2}}\right) 2$$

\*can't leave a fraction in a fraction! must mult. fraction by 2!

$$2x^2 + 4x - 6 - \frac{4}{2x+1}$$

$$2a+3 \overline{) a^2 - 5a + 5}$$

$$\begin{array}{r} 2a^3 - 7a^2 - 5a + 17 \\ - 2a^3 + 3a^2 \\ \hline \end{array}$$

$$\begin{array}{r} -10a^2 - 5a \\ +10a^2 + 15a \\ \hline \end{array}$$

$$\begin{array}{r} 10a + 17 \\ -10a + 15 \\ \hline 2 \end{array}$$

$$a^2 - 5a + 5 + \frac{2}{2a+3}$$

②  $x-1 \overline{) 5x^3 + 3x^2 + 7x + 4}$

$$\begin{array}{r} 5x^4 - 2x^3 + 4x^2 - 3x + 6 \\ - 5x^4 + 5x^3 \\ \hline \end{array}$$

$$\begin{array}{r} 3x^3 + 4x^2 \\ - 3x^3 + 3x^2 \\ \hline \end{array}$$

$$\begin{array}{r} 7x^2 - 3x \\ - 7x^2 + 7x \\ \hline \end{array}$$

$$\begin{array}{r} 4x + 6 \\ - 4x + 4 \\ \hline 10 \end{array}$$

$$5x^3 + 3x^2 + 7x + 4 + \frac{10}{x-1}$$

$$\begin{array}{r}
 x^2 + 2cx + 4c^2 \\
 \hline
 x+c \left| \begin{array}{l}
 x^3 + 3cx^2 + 6c^2x + 42c^3 \\
 -x^3 + \quad -cx^2 \\
 \hline
 2cx^2 + 6c^2x \\
 -2cx^2 + 2c^2x \\
 \hline
 4c^2x + 42c^3 \\
 -4c^2x + 4c^3 \\
 \hline
 38c^3
 \end{array} \right.
 \end{array}$$

$$\cancel{x^2 + 2cx + 4c^2} +$$

$$\boxed{x^2 + 2cx + 4c^2 + \frac{38c^3}{x+c}}$$

$$\begin{array}{r}
 x^3 - \sqrt{3}x^2 - 9x + 9\sqrt{3} \\
 \hline
 x + \sqrt{3} \quad \sqrt{x^4 + 0x^3 - 12x^2 + 0x + 27} \\
 - \quad \underline{x^4 + \sqrt{3}x^3} \\
 \quad \quad -\sqrt{3}x^3 - 12x^2 \\
 \quad \quad + \sqrt{3}x^2 + 3x^2 \\
 \quad \quad \quad \underline{-9x^2 + 0x} \\
 \quad \quad \quad \quad + 9x^2 + 9\sqrt{3}x \\
 \quad \quad \quad \quad \quad \underline{9\sqrt{3}x + 27} \\
 \quad \quad \quad \quad \quad \quad - \underline{9\sqrt{3}x + 27}
 \end{array}$$

$$\boxed{x^3 - \sqrt{3}x^2 - 9x + 9\sqrt{3}}$$

# HM3 Long Division $\rightarrow$ oDDS

$$\begin{array}{r} 3x - 7 \\ x - 3 \overline{) 3x^2 - 16x + 21} \\ \underline{- 3x^2 + 9x} \phantom{+ 21} \\ -7x + 21 \\ \underline{+ 7x + 21} \\ 0 \end{array}$$

$$3x - 7$$

$$\begin{array}{r} x^2 - 6x + 18 \\ x + 2 \overline{) x^3 - 4x^2 + 6x - 4} \\ \underline{- x^3 + 2x^2} \phantom{+ 6x - 4} \\ -6x^2 + 6x \phantom{- 4} \\ \underline{+ 6x^2 + 12x} \phantom{- 4} \\ 18x - 4 \\ \underline{+ 18x + 36} \\ -40 \end{array}$$

$$x^2 - 6x + 18 - \frac{40}{x+2}$$

$$\begin{array}{r} 2x^2 - 2x - 6 \\ x + 1 \overline{) 2x^3 + 0x^2 - 8x + 0} \\ \underline{- 2x^3 + 2x^2} \phantom{+ 0} \\ -2x^2 - 8x \phantom{+ 0} \\ \underline{+ 2x^2 + 2x} \phantom{+ 0} \\ -6x + 0 \\ \underline{+ 6x + 6} \\ 6 \end{array}$$

$$2x^2 - 2x - 6 + \frac{6}{x+1}$$

$$\textcircled{7} \quad 5c-2 \quad \overline{) \begin{array}{r} 2c^2 + c - 1 \\ 10c^3 + c^2 - 7c + 2 \\ -10c^3 + 4c^2 \end{array}}$$

$$\begin{array}{r} 5c^2 - 7c \\ -5c^2 + 2c \\ \hline -5c + 2 \\ +5c - 2 \\ \hline \end{array}$$

$$2c^2 + c - 1$$

$$\textcircled{9} \quad x + \frac{1}{4} \quad \overline{) \begin{array}{r} 4x - 4 \\ 4x^2 - 3x - 1 \\ -4x^2 + x \end{array}}$$

$$\begin{array}{r} -4x - 1 \\ +4x + 1 \\ \hline \end{array}$$

$$4x - 4$$

$$\textcircled{11} \quad x-2 \quad \overline{) \begin{array}{r} 4x^2 - 2x - 4 \\ 4x^3 - 10x^2 + 0x + 19 \\ -4x^3 + 8x^2 \end{array}}$$

$$\begin{array}{r} -2x^2 + 0x \\ +2x^2 + 4x \\ \hline -4x + 19 \\ +4x + 8 \\ \hline 11 \end{array}$$

$$4x^2 - 2x - 4 + \frac{11}{x-2}$$

13

$$\begin{array}{r}
 x^3 + 3x^2 + 2x - 1 \\
 3x - 2 \overline{) 3x^4 + 7x^3 + 0x^2 - 7x + 2} \\
 \underline{-3x^4 + 2x^3} \phantom{+ 0x^2 - 7x + 2} \\
 9x^3 + 0x^2 \phantom{- 7x + 2} \\
 \underline{-9x^3 + 6x^2} \phantom{- 7x + 2} \\
 6x^2 - 7x \phantom{+ 2} \\
 \underline{-6x^2 + 4x} \phantom{+ 2} \\
 -3x + 2 \\
 \underline{+3x + 2} \\
 4
 \end{array}$$

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

15

$$\begin{array}{r}
 x^4 + 2x^3 + 4x^2 + 8x + 16 \\
 x - 2 \overline{) x^5 + 0x^4 + 0x^3 + 0x^2 + 0x - 32} \\
 \underline{-x^4 + 2x^3} \phantom{+ 0x^2 + 0x - 32} \\
 2x^4 + 0x^3 \phantom{+ 0x^2 + 0x - 32} \\
 \underline{-2x^4 + 4x^3} \phantom{+ 0x^2 + 0x - 32} \\
 4x^3 + 0x^2 \phantom{+ 0x - 32} \\
 \underline{-4x^3 + 8x^2} \phantom{+ 0x - 32} \\
 8x^2 + 0x \phantom{- 32} \\
 \underline{-8x^2 + 16x} \phantom{- 32} \\
 16x - 32 \\
 \underline{-16x + 32} \\
 0
 \end{array}$$

$$x^4 + 2x^3 + 4x^2 + 8x + 16$$