

# LONG DIVISION / SYNTHETIC DIVISION

$$\begin{array}{r} 874 \\ 32 \end{array}$$

$$\begin{array}{r} 27 \frac{10}{32} \\ 32 \overline{) 874} \\ \underline{-64} \\ 234 \\ \underline{-224} \\ 10 \end{array}$$

dividend

①  $\underline{4x^5 + 4x^2 - 2x - 2}$

$2x^2 - 1$  ← divisor

↙ quotient

$2x^3 + X + 2$

$2x^3(2x^2-1)$   
 $x(2x^2-1)$   
 $2(2x^2-1)$

$$\begin{array}{r} 2x^2-1 \overline{) 4x^5 + 0x^4 + 0x^3 + 4x^2 - 2x - 2} \\ \underline{(-) 4x^5} \phantom{+ 0x^4} \phantom{+ 0x^3} \phantom{+ 4x^2} \phantom{- 2x} \phantom{- 2} \\ 2x^3 + 4x^2 - 2x - 2 \\ \underline{(-) 2x^3} \phantom{+ 4x^2} \phantom{- 2x} \phantom{- 2} \\ 4x^2 - x - 2 \\ \underline{(-) 4x^2} \phantom{- x} \phantom{- 2} \\ -x \phantom{- 2} \end{array}$$

$$\left\{ \begin{array}{l} \frac{4x^5}{2x^2} = 2x^3 \\ \frac{2x^3}{2x^2} = x \\ \frac{4x^2}{2x^2} = 2 \end{array} \right.$$

$-x$

remainder

ANSWER:  $2x^3 + x + 2 + \frac{-x}{2x^2 - 1}$  (remainder / divisor)

$$2x^4 - 3x^2 + 7x - 8$$

(2)

$$\begin{array}{r}
 \underbrace{2x^2(x^2+x-3)} \\
 \underbrace{-2x(x^2+x-3)} \\
 \underbrace{5(x^2+x-3)} \\
 \hline
 \end{array}
 \left| \begin{array}{r}
 2x^4 + 0x^3 - 3x^2 + 7x - 8 \\
 (-) \underline{2x^4 + 2x^3 - 6x^2} \\
 -2x^3 + 3x^2 + 7x - 8 \\
 (-) \underline{-2x^3 - 2x^2 + 6x} \\
 5x^2 + x - 8 \\
 (-) \underline{5x^2 + 5x - 15} \\
 -4x + 7
 \end{array} \right.
 \left. \begin{array}{l}
 \frac{2x^4}{x^2} = 2x^2 \\
 \frac{-2x^3}{x^2} = -2x \\
 \frac{-2x^3}{x^2} = -2x
 \end{array} \right.$$

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

### SYNTHETIC DIVISION

ONLY WITH DIVISORS OF DEGREE 1!  $x+2$   
 $2x-3$

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

Divisor = 0

$x + 2 = 0$

$x = -2$

shelf number

mult.

$$\begin{array}{r|rrrrr}
 -2 & 1 & 0 & -4 & 1 & 4 \\
 & \downarrow + & -2 & +4 & +0 & -2 \\
 \hline
 & 1x^3 & -2x^2 & 0x & 1 & 2
 \end{array}$$

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

remainder

$$\textcircled{4} \quad (6x^3 - 5x^2 + x - 4) \div (x - 1)$$

$$\begin{aligned} x - 1 &= 0 \\ x &= 1 \end{aligned}$$

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

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

$$\textcircled{5} \quad (8x^3 + 2x^2 - 49) \div (4x - 7)$$

$$x - \frac{7}{4}$$

$$\begin{aligned} 4x - 7 &= 0 \\ 4x &= 7 \\ x &= \frac{7}{4} \end{aligned}$$

$$\begin{array}{r} \frac{7}{4} \overline{) 8 \quad 2 \quad 0 \quad -49} \\ \underline{\phantom{7} +14 \quad +28 \quad 49} \\ 8x^2 \quad 16x \quad 28 \quad | \quad 0 \leftarrow \text{remainder} \end{array}$$

$$\frac{8x^2 + 16x + 28}{\textcircled{4}} = \boxed{2x^2 + 4x + 7}$$