

Long Division Continued:

Examples:

1. $(x^4 - 6x^2 - 27) \div (x + 2)$

$$\begin{array}{r}
 x^3 - 2x^2 - 2x + 4 \\
 x+2 \overline{) x^4 + 0x^3 - 6x^2 + 0x - 27} \\
 \underline{-x^4 - 2x^3} \\
 -2x^3 - 6x^2 \\
 \underline{2x^3 + 4x^2} \\
 -2x^2 + 0x \\
 \underline{2x^2 + 4x} \\
 4x - 27 \\
 \underline{-4x - 8} \\
 -35
 \end{array}$$

$$\boxed{x^3 - 2x^2 - 2x + 4 - \frac{35}{x+2}}$$

$$\begin{aligned}
 \frac{x^4}{x} &= x^3(x+2) \\
 &= x^4 + 2x^3 \\
 &= -x^4 - 2x^3 \\
 \hline
 \frac{-2x^3}{x} &= -2x^2(x+2) \\
 &= -2x^3 - 4x^2 \\
 &= 2x^3 + 4x^2 \\
 \hline
 \frac{-2x^2}{x} &= -2x(x+2) \\
 &= -2x^2 - 4x \\
 &= 2x^2 + 4x \\
 \hline
 \frac{4x}{x} &= 4(x+2) \\
 &= 4x + 8 \\
 &= -4x - 8
 \end{aligned}$$

2. $(x^4 + 2x^2 + 8x + 5) \div (x^2 + 2x + 1)$

$$\begin{array}{r}
 x^2 - 2x + 5 \\
 x^2 + 2x + 1 \overline{) x^4 + 0x^3 + 2x^2 + 8x + 5} \\
 \underline{-x^4 - 2x^3 - x^2} \\
 -2x^3 + x^2 + 8x \\
 \underline{2x^3 + 4x^2 + 2x} \\
 5x^2 + 10x + 5 \\
 \underline{-5x^2 - 10x - 5} \\
 0
 \end{array}$$

$$\boxed{x^2 - 2x + 5}$$

$$\begin{aligned}
 \frac{x^4}{x^2} &= x^2(x^2 + 2x + 1) \\
 &= x^4 + 2x^3 + x^2 \\
 &= -x^4 - 2x^3 - x^2 \\
 \hline
 \frac{-2x^3}{x^2} &= -2x(x^2 + 2x + 1) \\
 &= -2x^3 - 4x^2 - 2x \\
 &= 2x^3 + 4x^2 + 2x \\
 \hline
 \frac{5x^2}{x^2} &= 5(x^2 + 2x + 1) \\
 &= 5x^2 + 10x + 5 \\
 &= -5x^2 - 10x - 5
 \end{aligned}$$

3.
$$\frac{x^5 + 3x^4 - 5x^3 - 10x^2 - 30x + 50}{x^2 + 3x - 5}$$

4.
$$\frac{x^5 + 1}{x + 1}$$