

LONG DIVISION

If you have a rational expression where the degree of the numerator is equal or greater than the degree of the denominator, then long division can be used to rewrite the expression. Here are two examples showing that process. We rewrite the expression as the quotient plus the remainder divided by the divisor.

$$\frac{x^4 + 4x^2 + 5}{x^2 + 1} = x^2 + 3 + \frac{2}{x^2 + 1}$$

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

$$\frac{8x^3 + 2x + 1}{2x + 1} = 4x^2 - 2x + 2 - \frac{1}{2x + 1}$$

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