

Rational Polynomials: Graphing and Asymptotes

Find the intercepts, if there are any.

Step 1: Set the numerator to 0 to solve for horizontal intercepts.

Step 2: Set the x to 0 to solve for vertical intercept.

Step 3: Set the denominator to 0 to solve for vertical asymptotes.

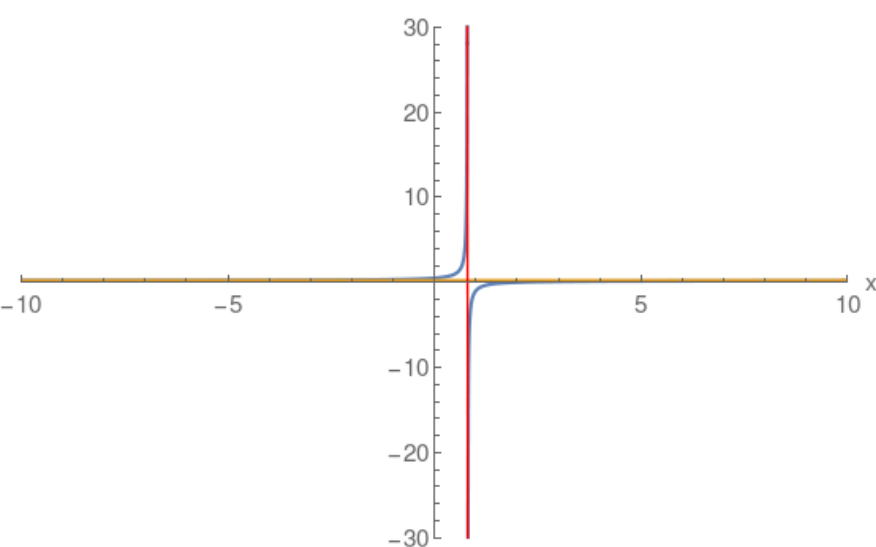
Step 4: Perform a long division to find the quotient which specifies the oblique asymptote.

Note: Blue curve the actual Rational function.
Red and Gold asymptotes.

Example: Horizontal Asymptote

$$\frac{x-2}{5x-4}$$

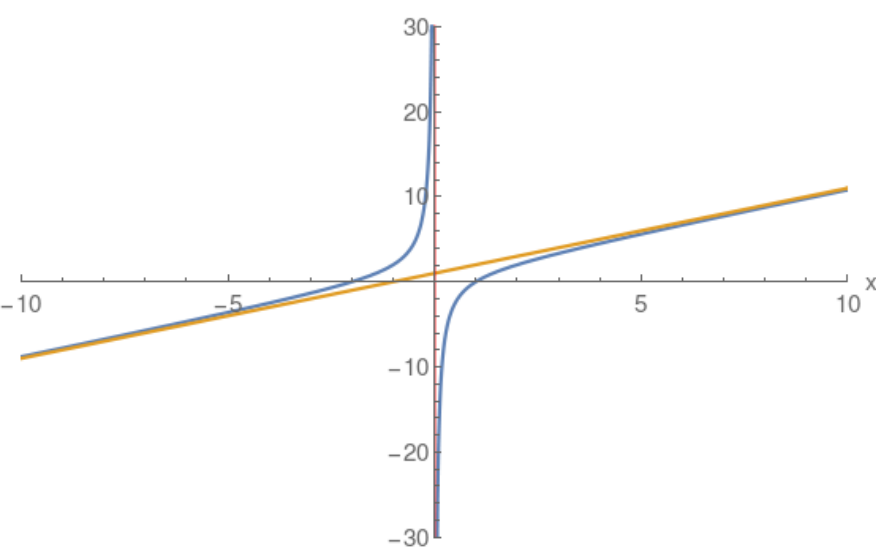
$$\begin{array}{r} + \left(\frac{1}{5} \right) \\ \hline \boxed{5x-4} \quad (1)x + (-2) \\ \left(\frac{x}{1} \right) + \left(-\frac{4}{5} \right) \\ + \left(-\frac{6}{5} \right) \end{array}$$



Example: Oblique Linear Asymptote

$$\frac{(x-1)(x+2)}{x}$$

$$\begin{array}{r} + \left(\frac{x}{1} \right) + \left(\frac{1}{1} \right) \\ \hline \boxed{x} \quad (1)x^2 + (1)x + (-2) \\ \left(\frac{x^2}{1} \right) \\ + (1)x + (-2) \\ + \left(\frac{x}{1} \right) \\ + \left(-2 \right) \end{array}$$



Example: Multiple Vertical Asymptotes

$$\frac{x-1}{(x-3)(x+3)}$$

$$\begin{array}{r} + \left(\frac{0}{1} \right) \\ \hline \left(\frac{x}{1} \right) + \left(-1 \right) \end{array}$$

