

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.

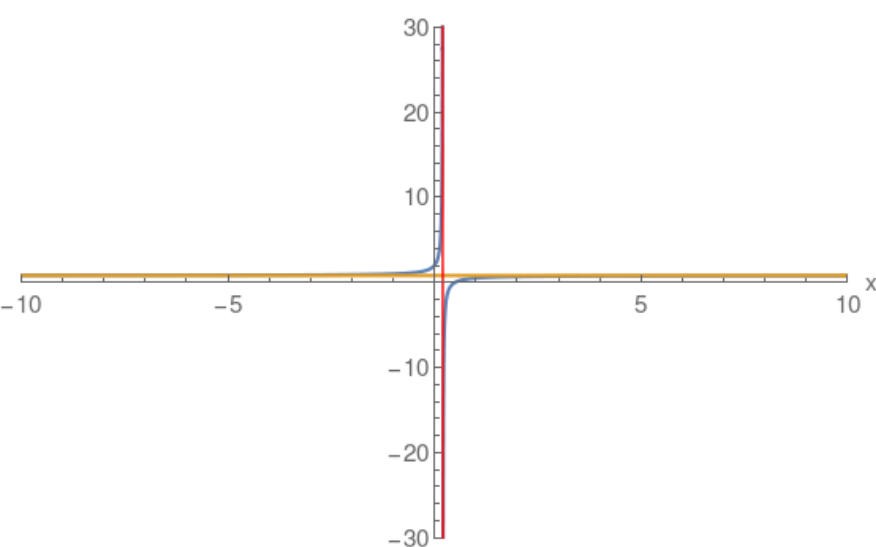
Step 4: Perform a long division to find the quotient which specifies the oblique asymptote.

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

Example: Horizontal Asymptote

$$\frac{4x-2}{5x-1}$$

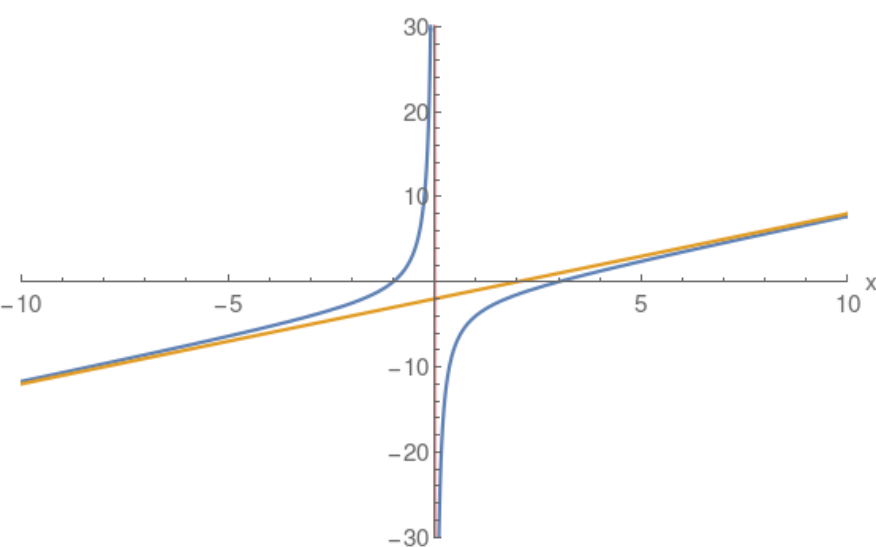
$$\begin{array}{r} + \left(\frac{4}{5} \right) \\ \hline \boxed{5x-1} \quad (4)x + (-2) \\ \quad \left(\frac{4x}{1} \right) + \left(\frac{-\frac{4}{5}}{1} \right) \\ \quad + \left(\frac{-\frac{6}{5}}{1} \right) \end{array}$$



Example: Oblique Linear Asymptote

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

$$\begin{array}{r} + \left(\frac{x}{1} \right) + \left(\frac{-2}{1} \right) \\ \hline \boxed{x} \quad (1)x^2 + (-2)x + (-3) \\ \quad \left(\frac{x^2}{1} \right) \\ \quad + (-2)x + (-3) \\ \quad + \left(\frac{-2x}{1} \right) \\ \quad + \left(\frac{-3}{1} \right) \end{array}$$



Example: Multiple Vertical Asymptotes

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

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

