

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.

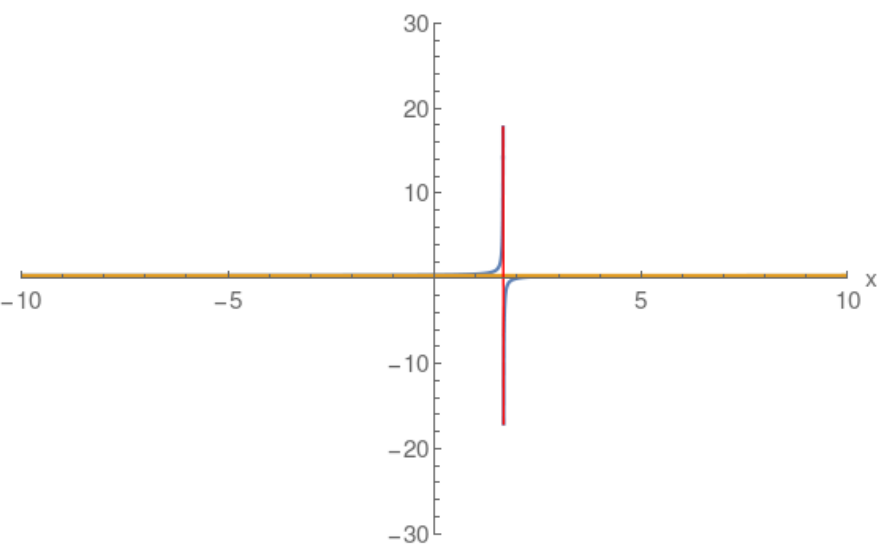
Step 4: Perform a long division to find the quotient which specifies the oblique asymptote.

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

Example: Horizontal Asymptote

$$\frac{x-2}{3x-5}$$

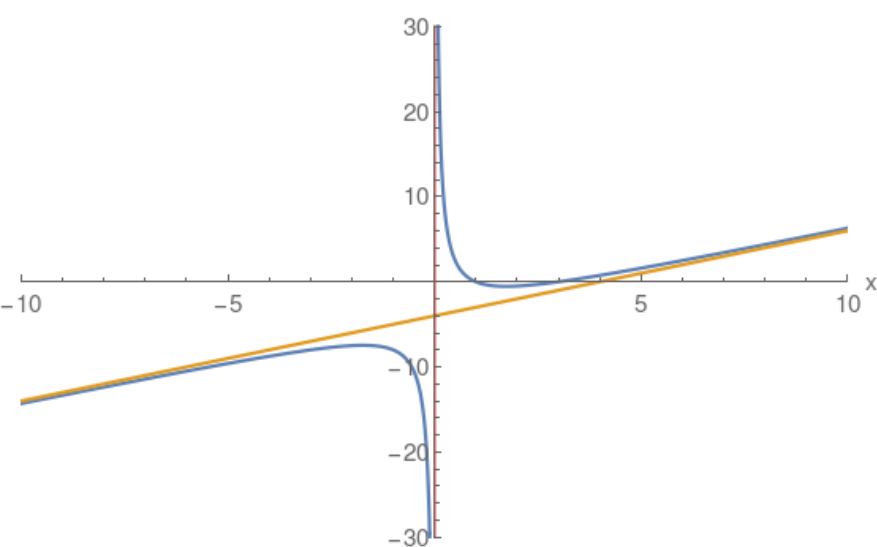
$$\begin{array}{r} + \left(\frac{1}{3} \right) \\ \hline 3x-5 \quad (1)x + (-2) \\ (x) + \left(-\frac{5}{3} \right) \\ + \left(-\frac{1}{3} \right) \end{array}$$



Example: Oblique Linear Asymptote

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

$$\begin{array}{r} + \left(x \right) + \left(-4 \right) \\ \hline x \quad (1)x^2 + (-4)x + (3) \\ (x^2) \\ + (-4)x + (3) \\ + \left(-4x \right) \\ + \left(3 \right) \end{array}$$



Example: Multiple Vertical Asymptotes

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

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

