

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.

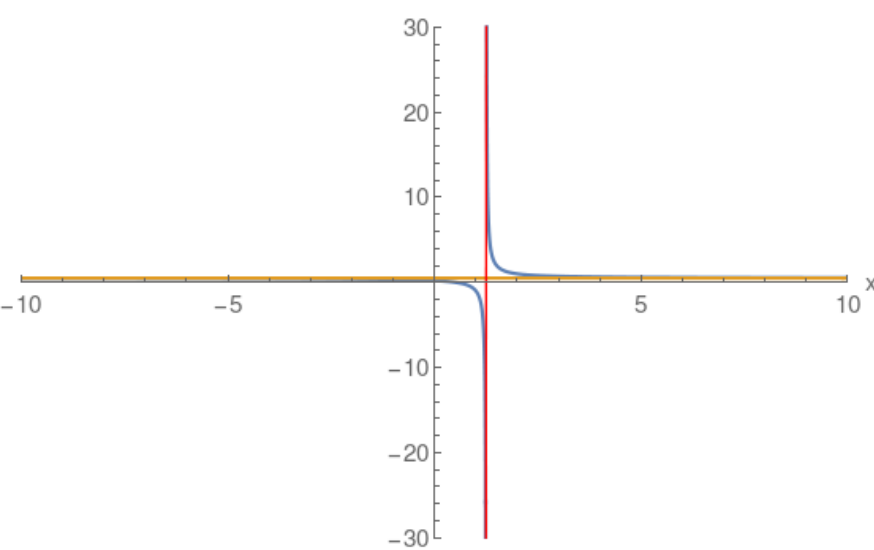
Step 4: Perform a long division to find the quotient which specifies the oblique asymptote.

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

Example: Horizontal Asymptote

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

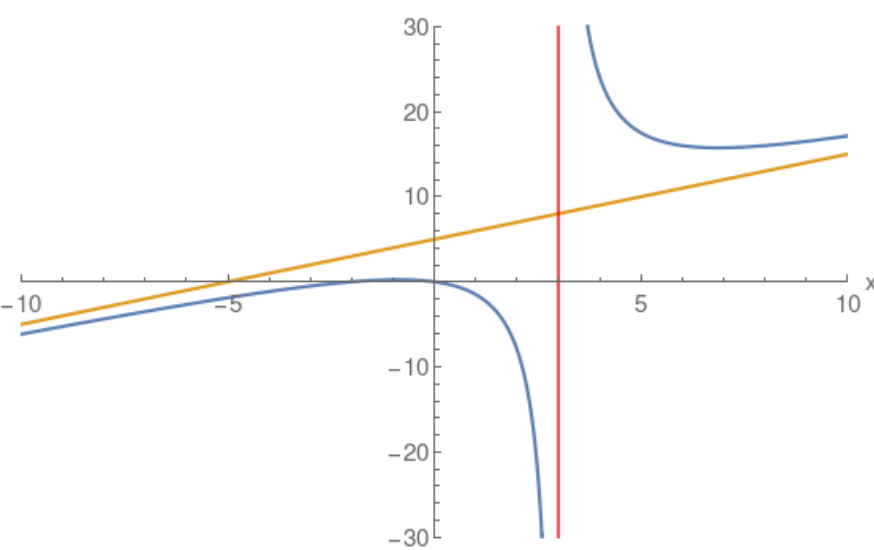
$$\begin{array}{r} + \left(\frac{1}{2}\right) \\ \hline 4x-5 \quad (2)x \quad + (-1) \\ \quad (2x) \quad + \left(-\frac{5}{2}\right) \\ \quad + \left(\frac{3}{2}\right) \end{array}$$



Example: Oblique Linear Asymptote

$$\frac{x(x+2)}{x-3}$$

$$\begin{array}{r} + \left(x\right) \quad + \left(5\right) \\ \hline x-3 \quad (1)x^2 \quad + (2)x \\ \quad (x^2) \quad + (-3x) \\ \quad + (5)x \\ \quad + (5x) \quad + (-15) \\ \quad + (15) \end{array}$$



Example: Multiple Vertical Asymptotes

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

$$\begin{array}{r} + \left(0\right) \\ \hline (x) \quad + \left(3\right) \end{array}$$

