

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.

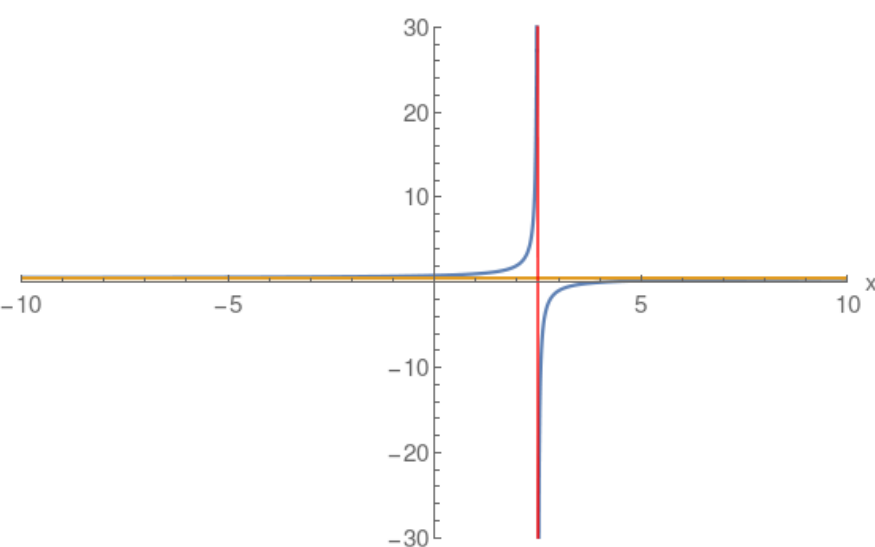
Step 4: Perform a long division to find the quotient which specifies the oblique asymptote.

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

Example: Horizontal Asymptote

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

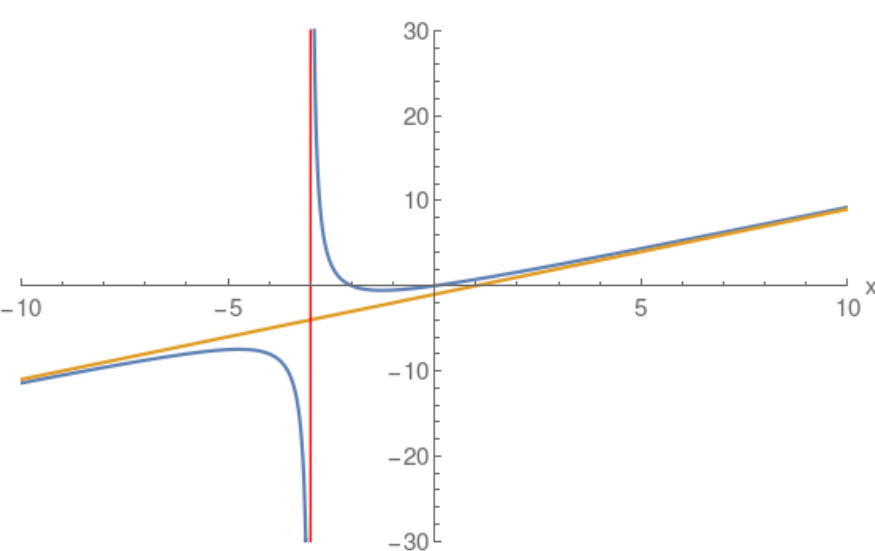
$$\begin{array}{r} + \left(\frac{1}{2}\right) \\ \hline 2x-5 \quad (1)x + (-4) \\ \left(\frac{x}{1}\right) + \left(-\frac{5}{2}\right) \\ + \left(-\frac{3}{2}\right) \end{array}$$



Example: Oblique Linear Asymptote

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

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



Example: Multiple Vertical Asymptotes

$$\frac{x-3}{(x-2)(x-1)}$$

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

