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.

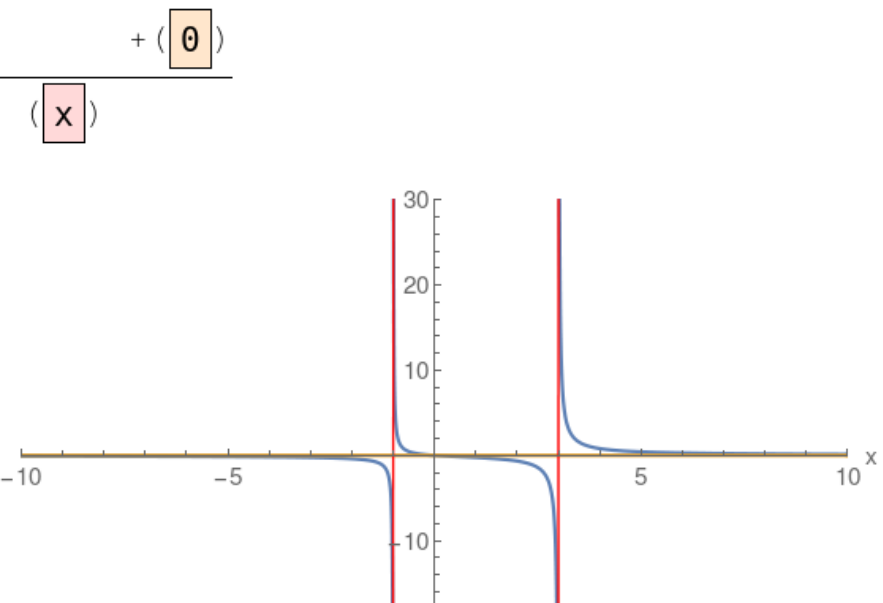
Step 4: Perform a long division to find the quotient which specifies the oblique asymptote.

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

Example: Horizontal Asymptote

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

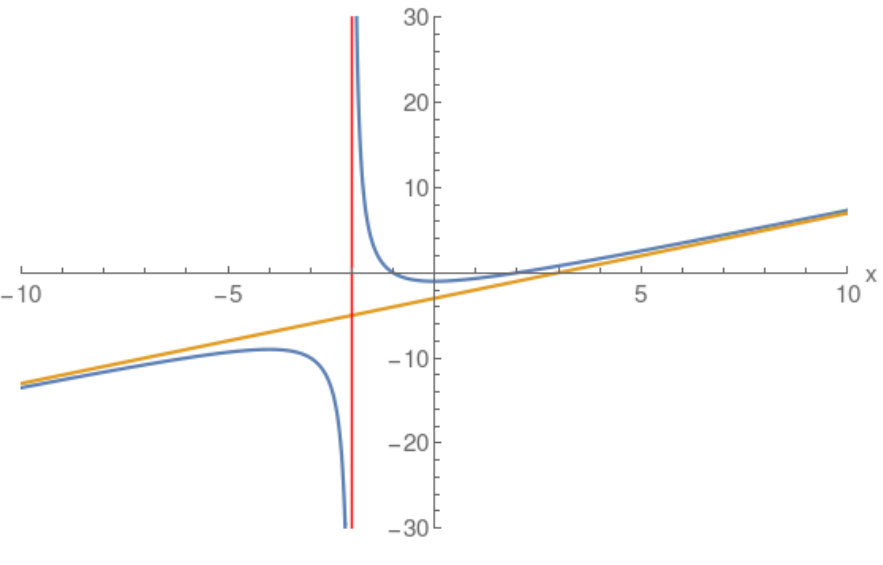
$$\begin{array}{r|l} & +\left(\frac{1}{5}\right) \\ \hline 5x-3 & (1)\,x \quad +(-2) \\ & \left(x\right) \quad +\left(-\frac{3}{5}\right) \\ & \quad +\left(-\frac{7}{5}\right) \end{array}$$



Example: Oblique Linear Asymptote

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

$$\begin{array}{r|l} & +(x) \quad +(-3) \\ \hline x+2 & (1)\,x^2 \quad +(-1)\,x \quad +(-2) \\ & \left(x^2\right) \quad +(2x) \\ & \quad +(-3)\,x \quad +(-2) \\ & \quad +(-3x) \quad +(-6) \\ & \quad +(4) \end{array}$$



Example: Multiple Vertical Asymptotes

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

$$\begin{array}{r|l} & +(0) \\ \hline (x) \end{array}$$