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.

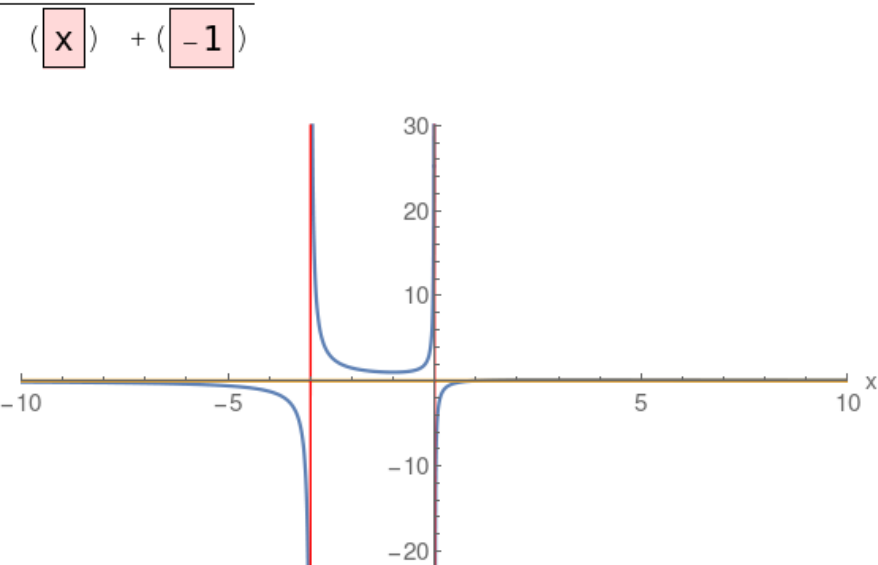
Step 4: Perform a long division to find the quotient which specifies the oblique asymptote.

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

Example: Horizontal Asymptote

$\frac{3x-1}{4x-2}$

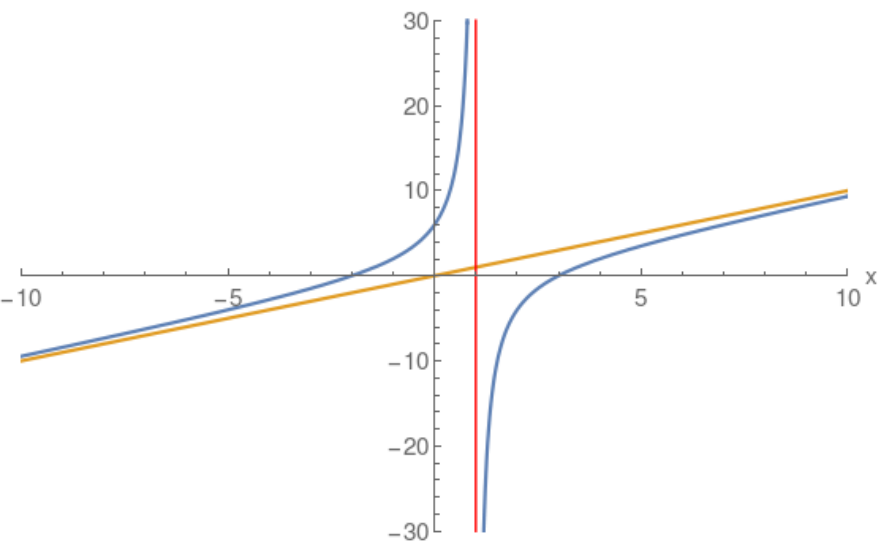
$$\begin{array}{r|l} & +\left(\frac{3}{4}\right) \\ \hline 4x-2 & (3)\,x \quad +(-1) \\ & \left(3x\right) \quad +\left(-\frac{3}{2}\right) \\ & +\left(\frac{1}{2}\right) \end{array}$$



Example: Oblique Linear Asymptote

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

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



Example: Multiple Vertical Asymptotes

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

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