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.

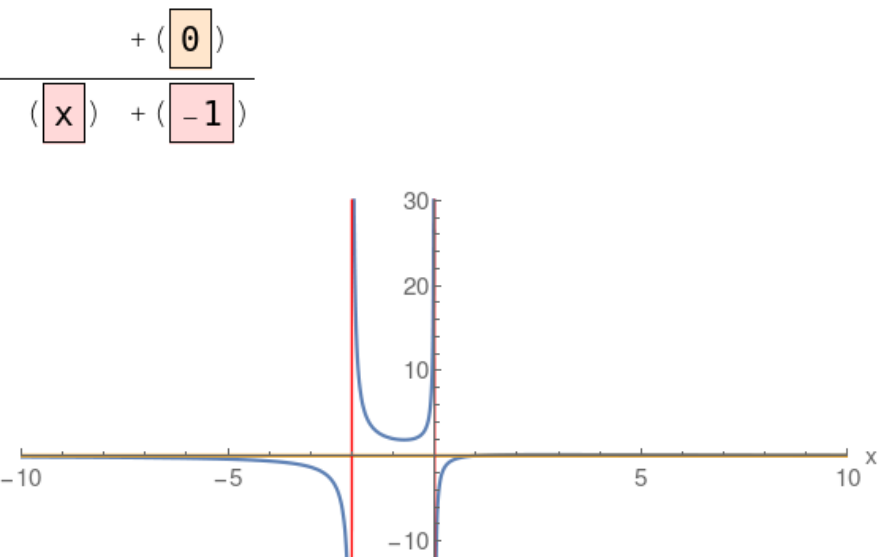
Step 4: Perform a long division to find the quotient which specifies the oblique asymptote.

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

Example: Horizontal Asymptote

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

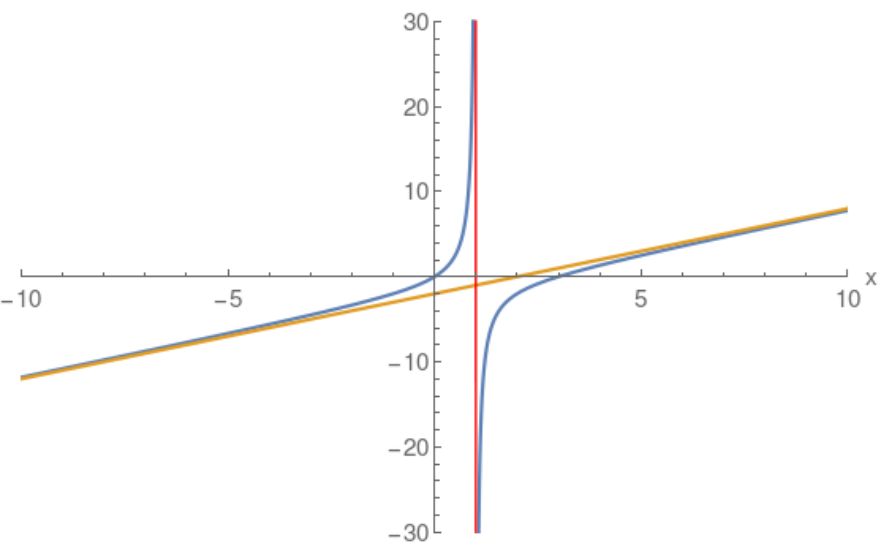
$$\begin{array}{r|l} & +(5) \\ \hline x-2 & (5)\,x \quad +(-3) \\ & (5x) \quad +(-10) \\ & +(7) \end{array}$$



Example: Oblique Linear Asymptote

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

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



Example: Multiple Vertical Asymptotes

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

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