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.

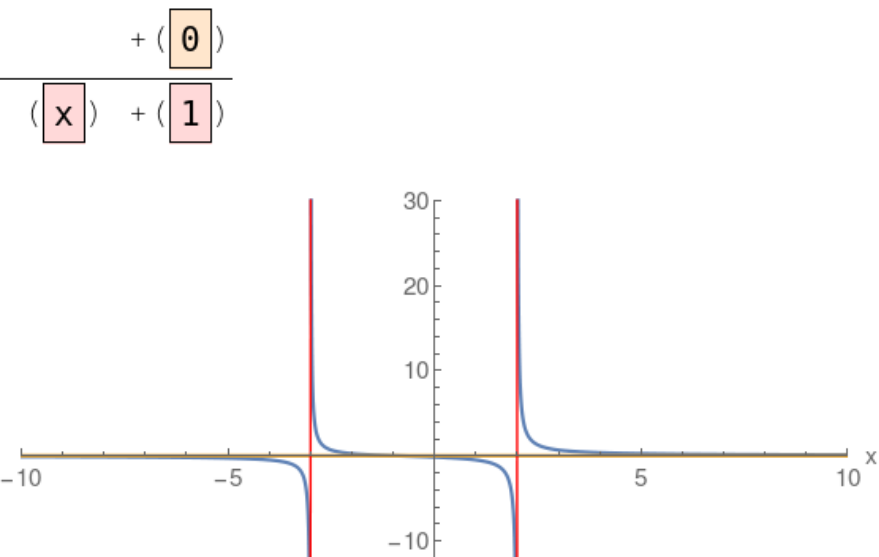
Step 4: Perform a long division to find the quotient which specifies the oblique asymptote.

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

Example: Horizontal Asymptote

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

$$\begin{array}{r|l} & +(2) \\ \hline x-4 & (2)\,x \;+(-3) \\ & (2x) \;+(-8) \\ & +(5) \end{array}$$



Example: Oblique Linear Asymptote

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

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

Example: Multiple Vertical Asymptotes

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

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