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.

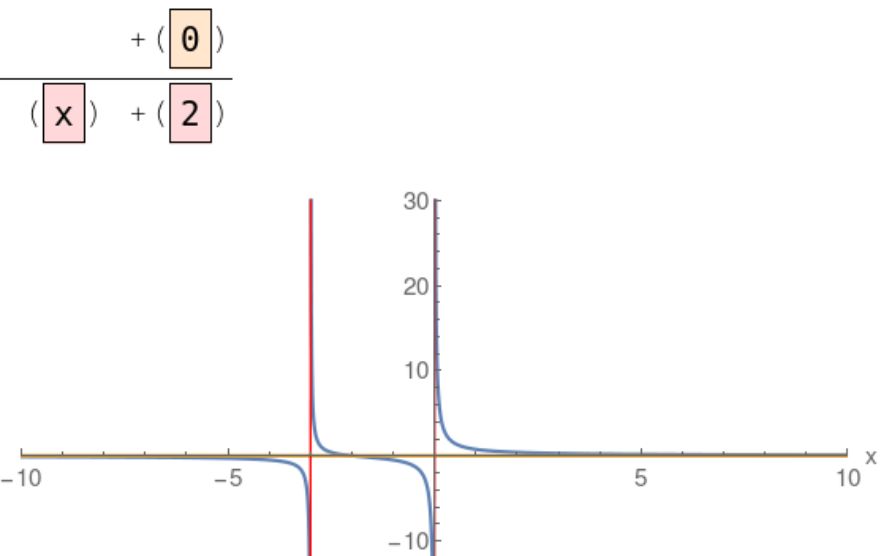
Step 4: Perform a long division to find the quotient which specifies the oblique asymptote.

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

Example: Horizontal Asymptote

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

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



Example: Oblique Linear Asymptote

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

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

Example: Multiple Vertical Asymptotes

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

$$\begin{array}{r|l} & +(0) \\ \hline (x) & +(2) \end{array}$$