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.

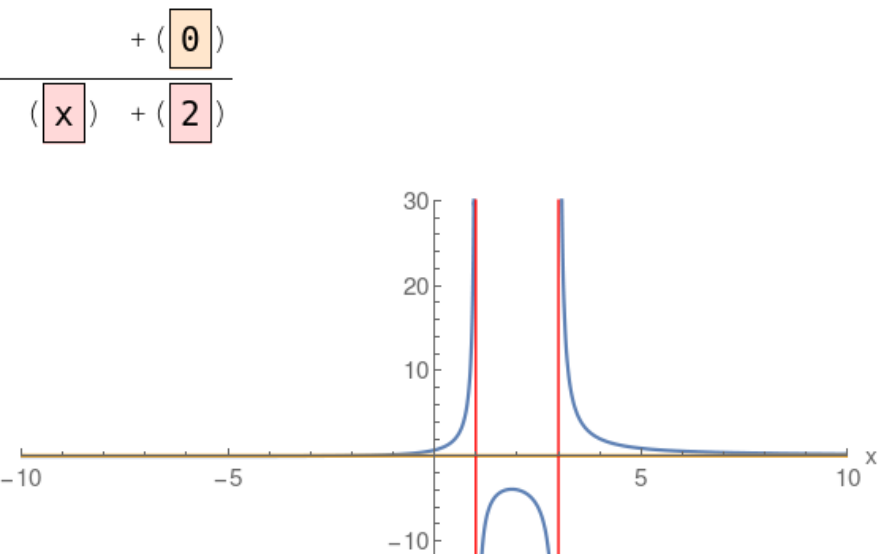
Step 4: Perform a long division to find the quotient which specifies the oblique asymptote.

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

Example: Horizontal Asymptote

$$\frac{3x-5}{2x-1}$$

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



Example: Oblique Linear Asymptote

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

$$\begin{array}{r|l} & +(x) \quad +(-4) \\ \hline x-1 & (1)\,x^2 \quad +(-5)\,x \quad +(6) \\ & \left(x^2\right) \quad +(-x) \\ & +(-4)\,x \quad +(6) \\ & +(-4x) \quad +(4) \\ & +(2) \end{array}$$

Example: Multiple Vertical Asymptotes

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

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