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.

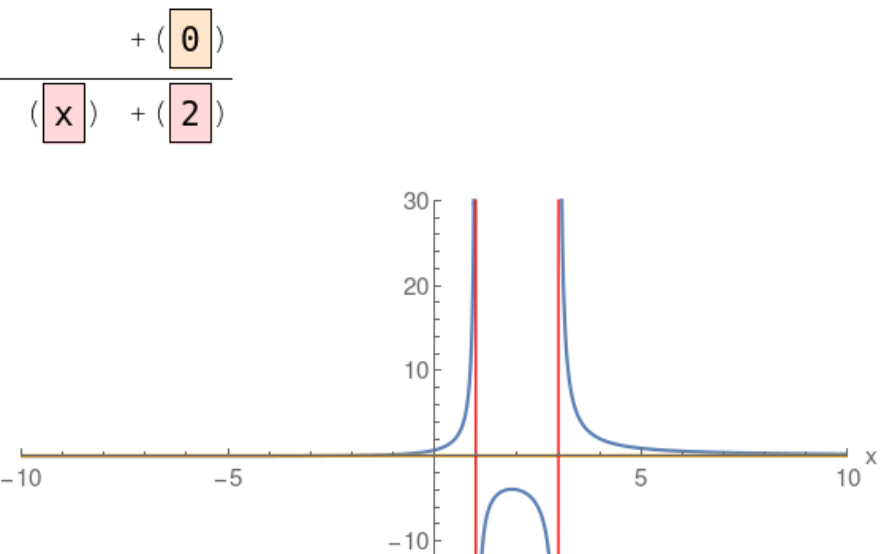
Step 4: Perform a long division to find the quotient which specifies the oblique asymptote.

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

Example: Horizontal Asymptote

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

$$\begin{array}{r|l} & +\left(\frac{1}{3}\right) \\ \hline 3x-2 & (1)x+(-4) \\ & \left(x\right)+\left(-\frac{2}{3}\right) \\ & +\left(-\frac{10}{3}\right) \end{array}$$



Example: Oblique Linear Asymptote

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

$$\begin{array}{r|l} & +(x) \quad +(-6) \\ \hline x+3 & (1)x^2+(-3)x+(2) \\ & \left(x^2\right)+(3x) \\ & +(-6)x+(2) \\ & +(-6x)+(-18) \\ & +(20) \end{array}$$

Example: Multiple Vertical Asymptotes

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

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