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.

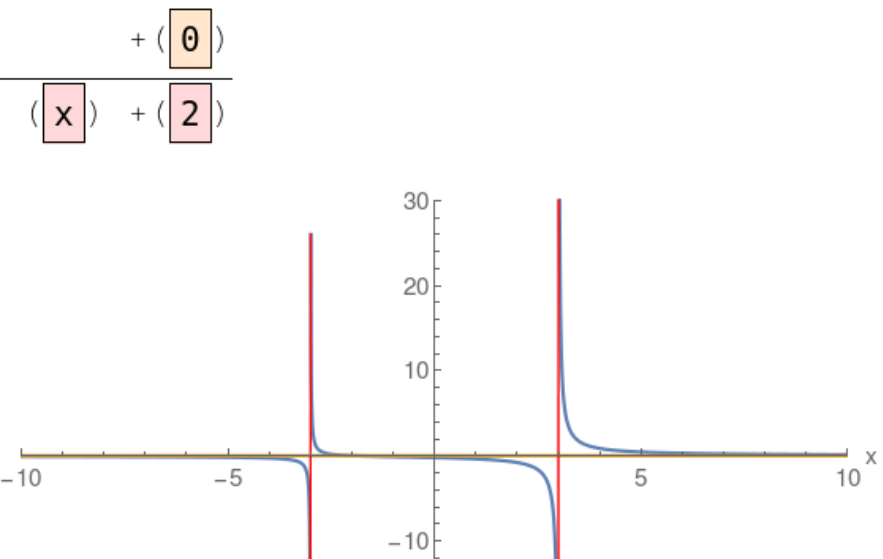
Step 4: Perform a long division to find the quotient which specifies the oblique asymptote.

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

Example: Horizontal Asymptote

$$\frac{4x-1}{5x-2}$$

$$\begin{array}{l|ll} & & +\left(\frac{4}{5}\right) \\ \hline 5x-2 & (4)\,x & +(-1) \\ & (4x) & +\left(-\frac{8}{5}\right) \\ & & +\left(\frac{3}{5}\right) \end{array}$$



Example: Oblique Linear Asymptote

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

$$\begin{array}{l|ll} & & +(x) & +(3) \\ \hline x-2 & (1)\,x^2 & +(1)\,x & \\ & (x^2) & +(-2x) & \\ & & +(3)\,x & \\ & & +(3x) & +(-6) \\ & & & +(6) \end{array}$$

Example: Multiple Vertical Asymptotes

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

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