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.

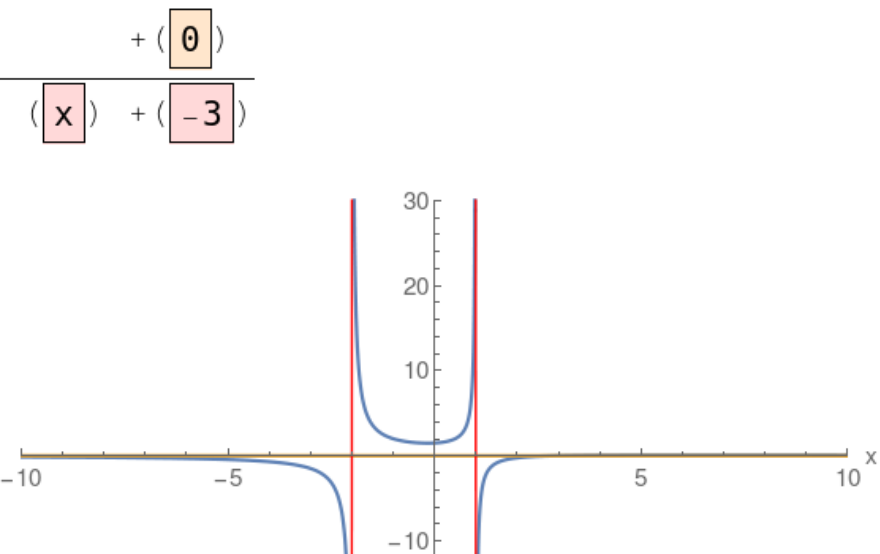
Step 4: Perform a long division to find the quotient which specifies the oblique asymptote.

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

Example: Horizontal Asymptote

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

$$\begin{array}{r|l} & +\left(\frac{1}{5}\right) \\ \hline 5x-2 & (1)x+(-3) \\ & \left(x\right)+\left(-\frac{2}{5}\right) \\ & +\left(-\frac{13}{5}\right) \end{array}$$



Example: Oblique Linear Asymptote

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

$$\begin{array}{r|ll} & +(x) & +(-1) \\ \hline x+1 & (1)x^2 & +(-9) \\ & \left(x^2\right)+\left(x\right) & \\ & +(-1)x & +(-9) \\ & +\left(-x\right) & +\left(-1\right) \\ & & +(-8) \end{array}$$

Example: Multiple Vertical Asymptotes

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

$$\begin{array}{r|l} & +(0) \\ \hline (x)+(-3) & \end{array}$$