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.

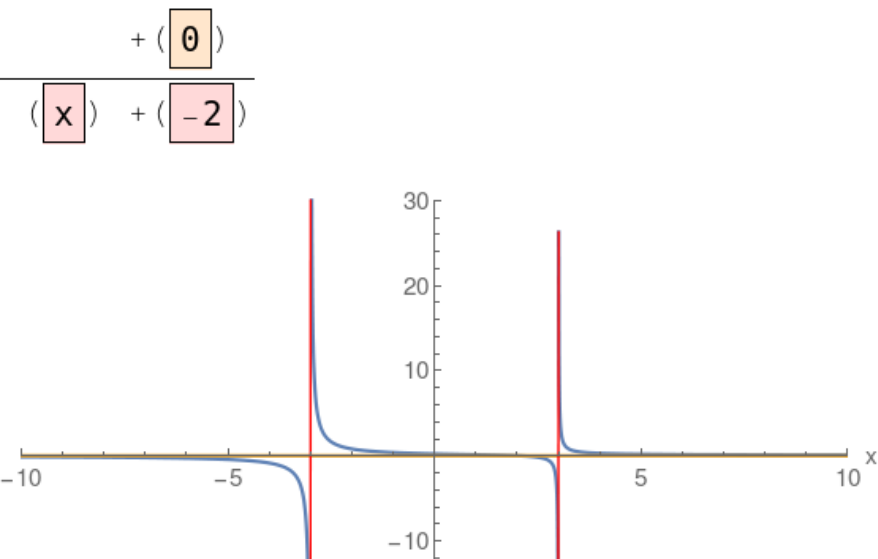
Step 4: Perform a long division to find the quotient which specifies the oblique asymptote.

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

Example: Horizontal Asymptote

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

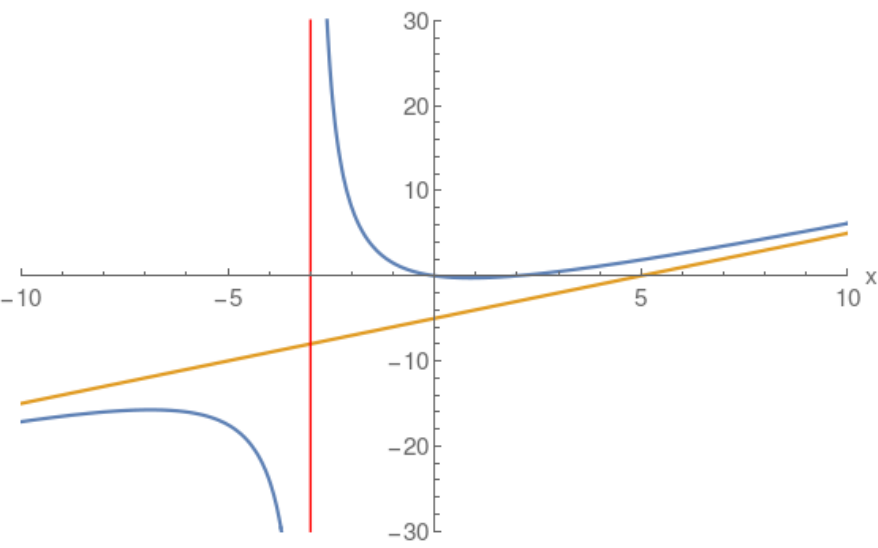
$$\begin{array}{r|l} & +\left(\frac{1}{4}\right) \\ \hline 4x-3 & (1)\,x \;+(-2) \\ & \left(x\right) \;+\left(-\frac{3}{4}\right) \\ & +\left(-\frac{5}{4}\right) \end{array}$$



Example: Oblique Linear Asymptote

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

$$\begin{array}{r|l} & +(x) \quad +(-5) \\ \hline x+3 & (1)\,x^2 \;+(-2)\,x \\ & \left(x^2\right) \;+(3x) \\ & +(-5)\,x \\ & +(-5x) \;+(-15) \\ & +(15) \end{array}$$



Example: Multiple Vertical Asymptotes

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

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