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.

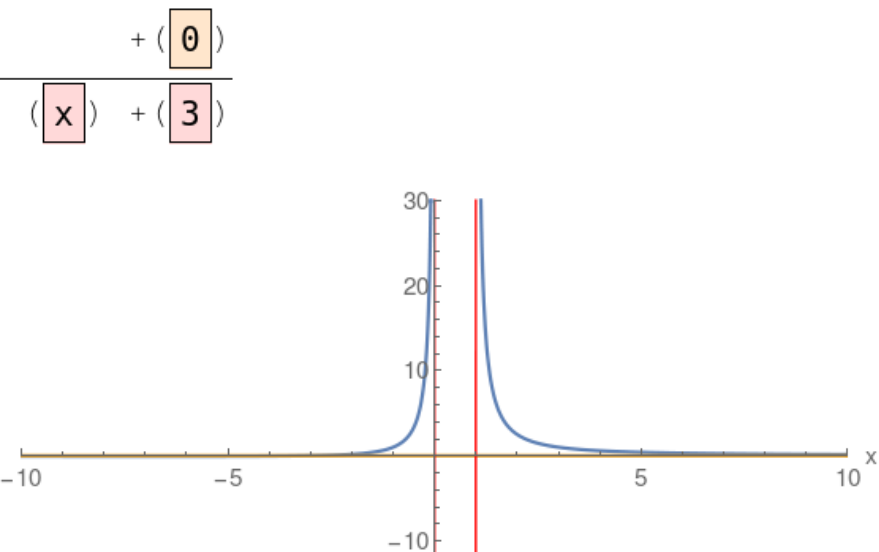
Step 4: Perform a long division to find the quotient which specifies the oblique asymptote.

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

Example: Horizontal Asymptote

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

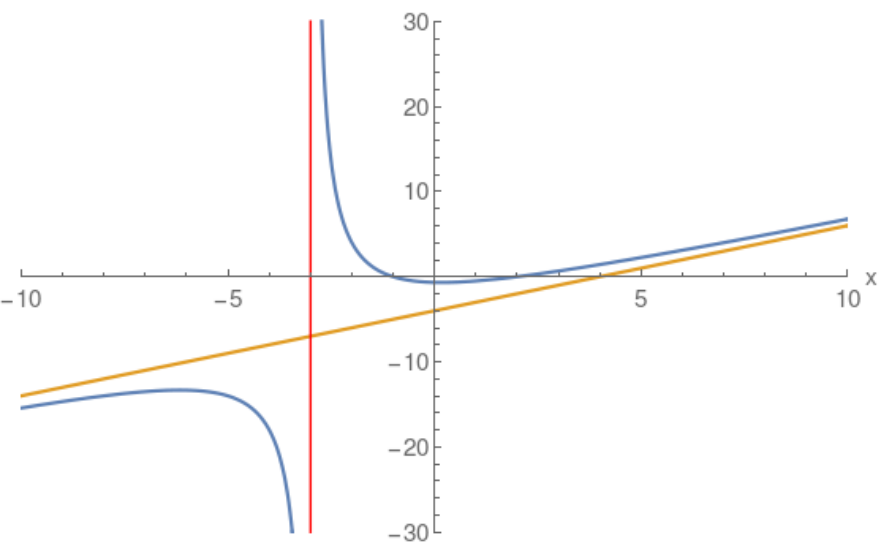
$$\begin{array}{r|l} & +(2) \\ \hline x-3 & (2)\,x \;+(-4) \\ & (2x) \;+(-6) \\ & +(2) \end{array}$$



Example: Oblique Linear Asymptote

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

$$\begin{array}{r|l} & +(x) \;\;+(-4) \\ \hline x+3 & (1)\,x^2 \;+(-1)\,x \;\;+(-2) \\ & (x^2) \;+(3x) \\ & +(-4)\,x \;\;+(-2) \\ & +(-4x) \;+(-12) \\ & +(10) \end{array}$$



Example: Multiple Vertical Asymptotes

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

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