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.

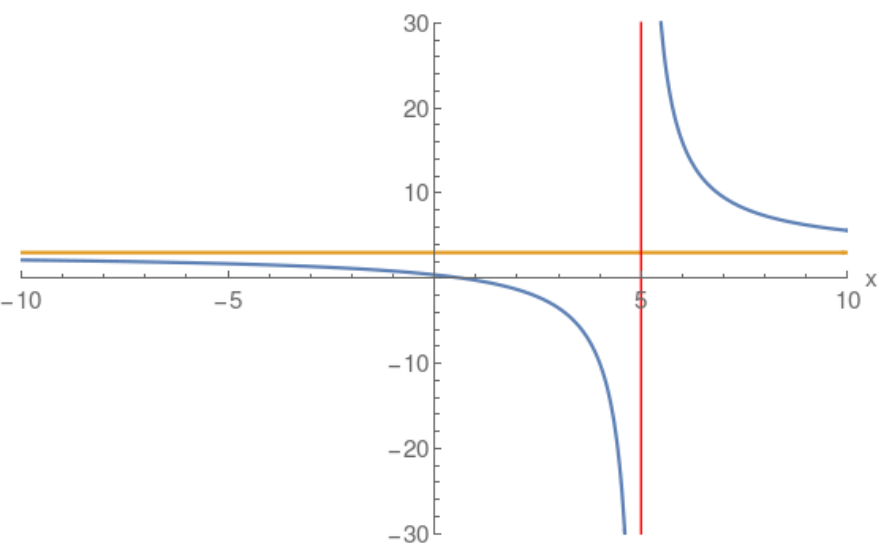
Step 4: Perform a long division to find the quotient which specifies the oblique asymptote.

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

Example: Horizontal Asymptote

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

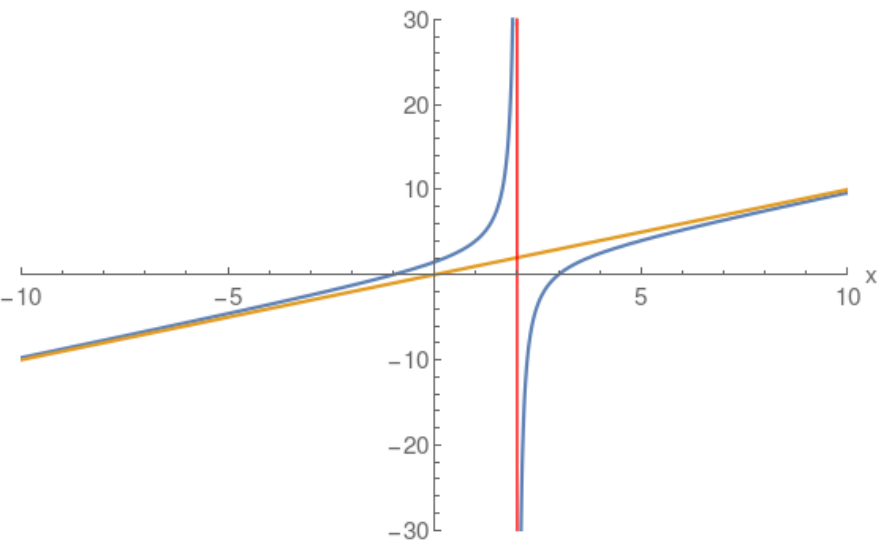
$$\begin{array}{r|l} & +(3) \\ \hline x-5 & (3)\,x \;+(-2) \\ & (3x) \;+(-15) \\ & +(13) \end{array}$$



Example: Oblique Linear Asymptote

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

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



Example: Multiple Vertical Asymptotes

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

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