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.

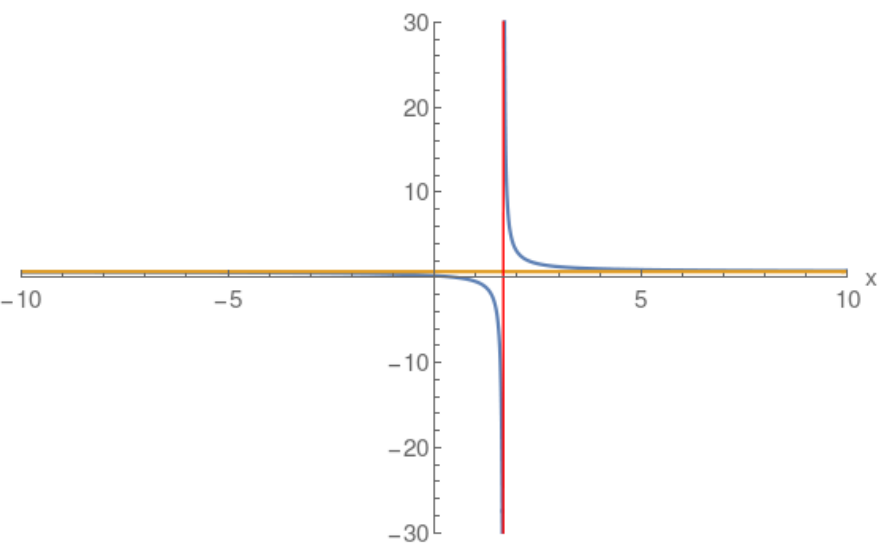
Step 4: Perform a long division to find the quotient which specifies the oblique asymptote.

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

Example: Horizontal Asymptote

$$\frac{2x-1}{3x-5}$$

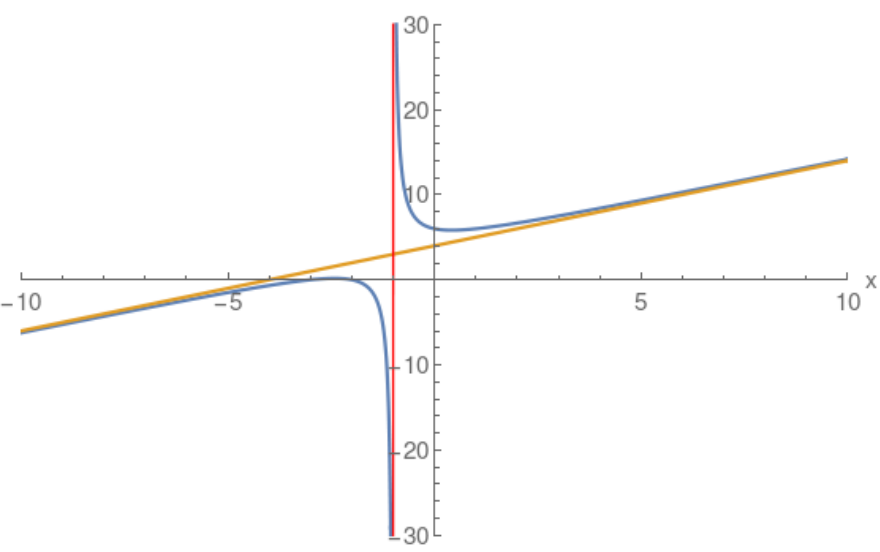
$$\begin{array}{l|ll} & & +\left(\frac{2}{3}\right) \\ \hline 3x-5 & (2)\,x & +(-1) \\ & \left(2x\right) & +\left(-\frac{10}{3}\right) \\ & & +\left(\frac{7}{3}\right) \end{array}$$



Example: Oblique Linear Asymptote

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

$$\begin{array}{l|lll} & & & +\left(x\right) \\ \hline x+1 & (1)\,x^2 & +(5)\,x & +(6) \\ & \left(x^2\right) & +\left(x\right) & \\ & & +(4)\,x & +(6) \\ & & +\left(4x\right) & +\left(4\right) \\ & & & +\left(2\right) \end{array}$$



Example: Multiple Vertical Asymptotes

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

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