Rational Polynomials: Graphing and Asymptotes

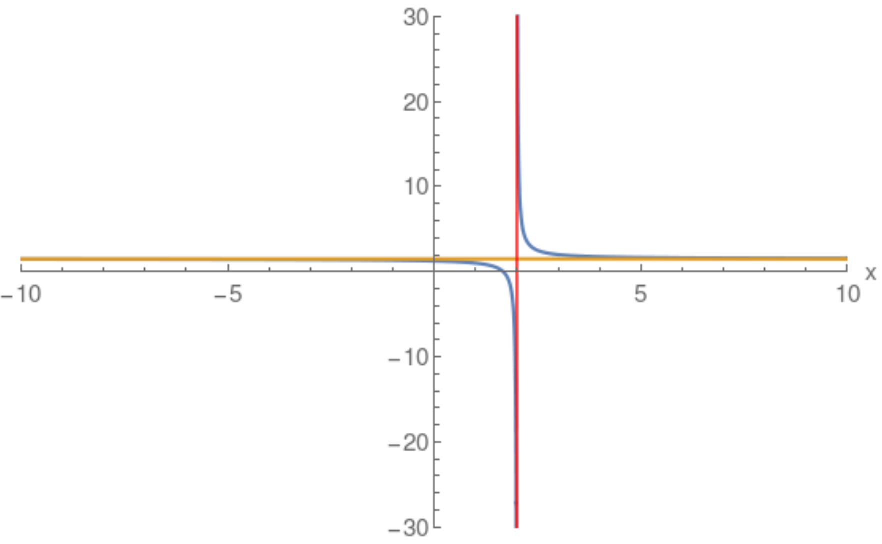
Find the intercepts, if there are any.
Step 1: Set the numerator to 0 to solve for horizontal intercepts.
Step 2: Set the x to 0 to solve for vertical intercept.
Step 3: Set the denominator to 0 to solve for vertical asymptotes.
Step 4: Perform a long division to find the quotient which specifies the oblique asymptote.

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

Example: Horizontal Asymptote

$\frac{3x-5}{2x-4}$

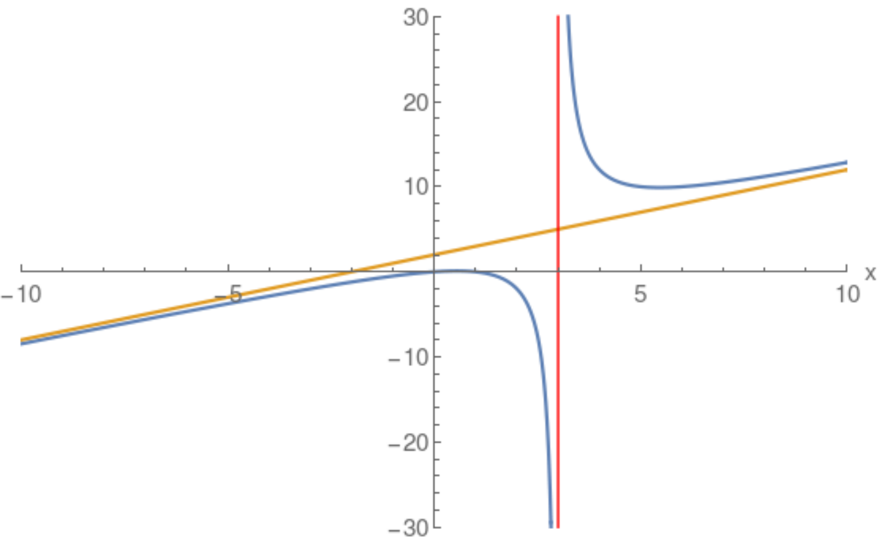
$$
\begin{array}{l|ll}
 & & +\left(\boxed{\tfrac{3}{2}}\right) \\
\hline
\boxed{2x-4} & (3)\,x & +(-5) \\
 & \left(\boxed{3x}\right) & +\left(\boxed{-6}\right) \\
 & & +\left(\boxed{1}\right)
\end{array}
$$



Example: Oblique Linear Asymptote

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

$$
\begin{array}{l|lll}
 & & +\left(\boxed{x}\right) & +\left(\boxed{2}\right) \\
\hline
\boxed{x-3} & (1)\,x^2 & +(-1)\,x & \\
 & \left(\boxed{x^2}\right) & +\left(\boxed{-3x}\right) & \\
 & & +(2)\,x & \\
 & & +\left(\boxed{2x}\right) & +\left(\boxed{-6}\right) \\
 & & & +\left(\boxed{6}\right)
\end{array}
$$



Example: Multiple Vertical Asymptotes

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

$$
\begin{array}{ll}
 & +\left(\boxed{0}\right) \\
\hline
\left(\boxed{x}\right) & +\left(\boxed{2}\right)
\end{array}
$$