Rational Polynomials: Graphing and Asymptotes

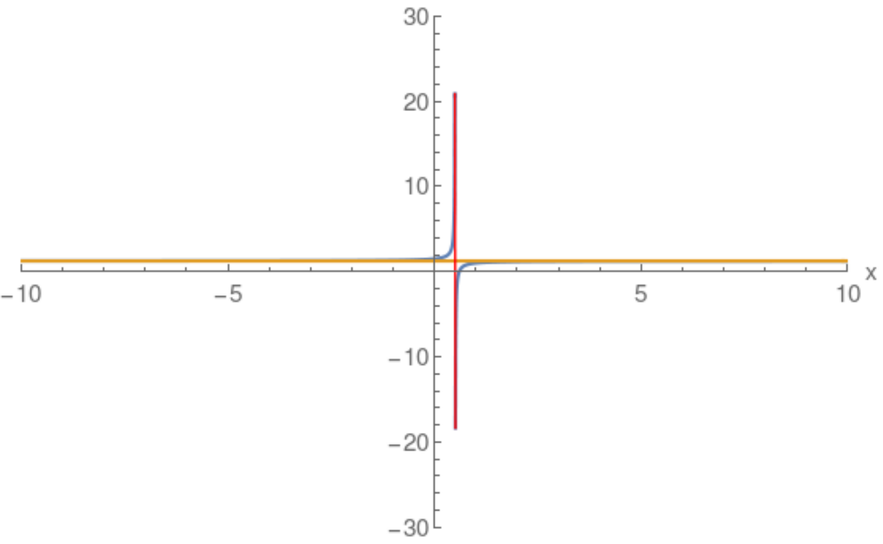
Find the intercepts, if there are any.
Step 1: Set the numerator to 0 to solve for horizontal intercepts.
Step 2: Set the x to 0 to solve for vertical intercept.
Step 3: Set the denominator to 0 to solve for vertical asymptotes.
Step 4: Perform a long division to find the quotient which specifies the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

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

Example: Horizontal Asymptote

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

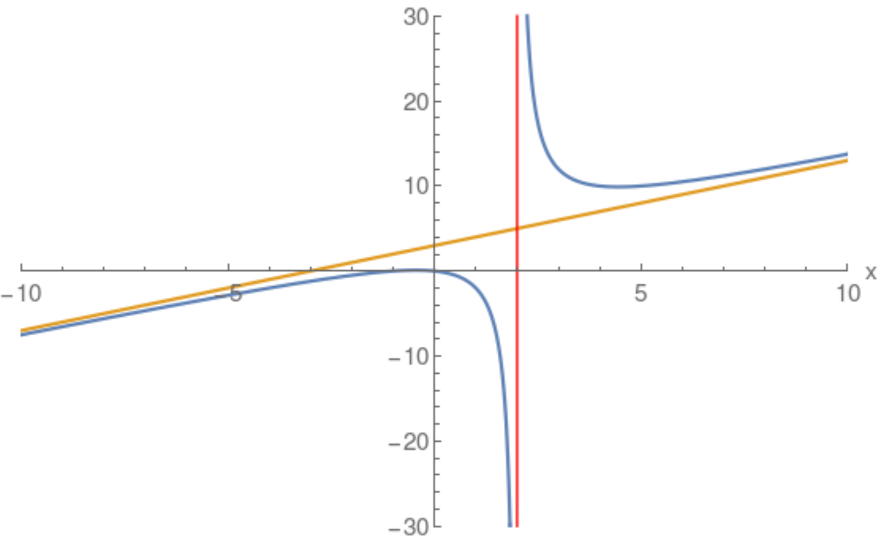
$$
\begin{array}{r|ll}
 & & +\left(\frac{5}{4}\right) \\
\hline
4x-2 & (5)x & +(-3) \\
 & (5x) & +\left(-\frac{5}{2}\right) \\
 & & +\left(-\frac{1}{2}\right)
\end{array}
$$



Example: Oblique Linear Asymptote

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

$$
\begin{array}{r|lll}
 & & +(x) & +(3) \\
\hline
x-2 & (1)x^2 & +(1)x & \\
 & (x^2) & +(-2x) & \\
 & & +(3)x & \\
 & & +(3x) & +(-6) \\
 & & & +(6)
\end{array}
$$



Example: Multiple Vertical Asymptotes

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

$$
\begin{array}{ll}
 & +(0) \\
\hline
(x) & +(-1)
\end{array}
$$