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.

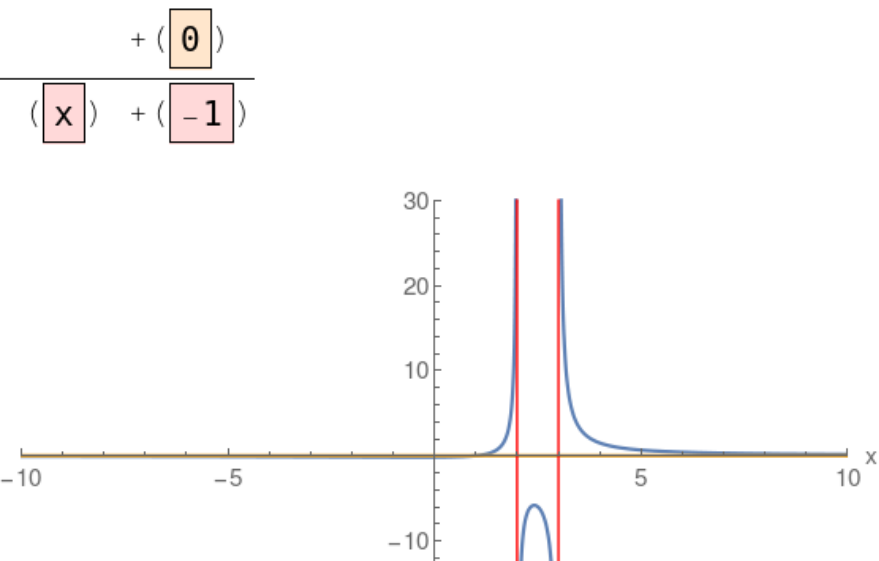
Step 4: Perform a long division to find the quotient which specifies the oblique asymptote.

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

Example: Horizontal Asymptote

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

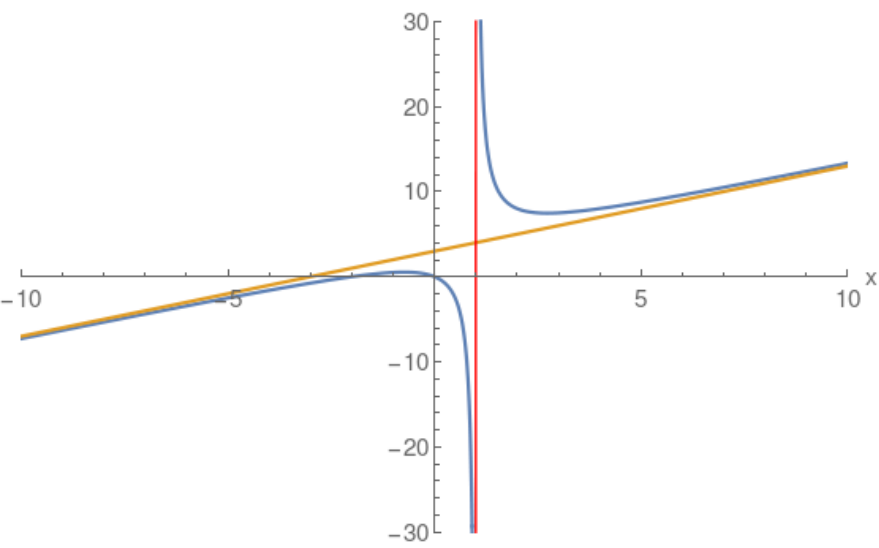
$$
\begin{array}{r|l}
 & +(2) \\
\hline
x-4 & (2)\,x \quad +(-3) \\
 & (2x) \quad +(-8) \\
 & +(5)
\end{array}
$$



Example: Oblique Linear Asymptote

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

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



Example: Multiple Vertical Asymptotes

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

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