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.

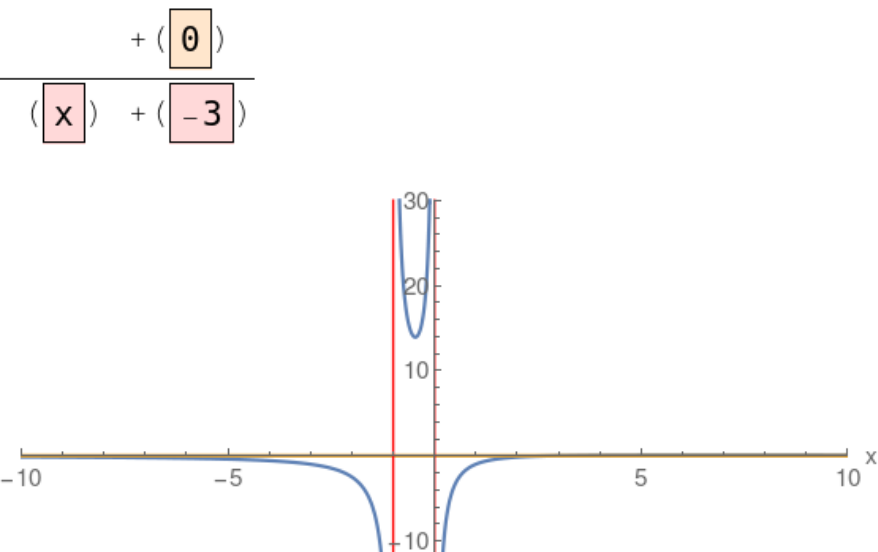
Step 4: Perform a long division to find the quotient which specifies the oblique asymptote.

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

Example: Horizontal Asymptote

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

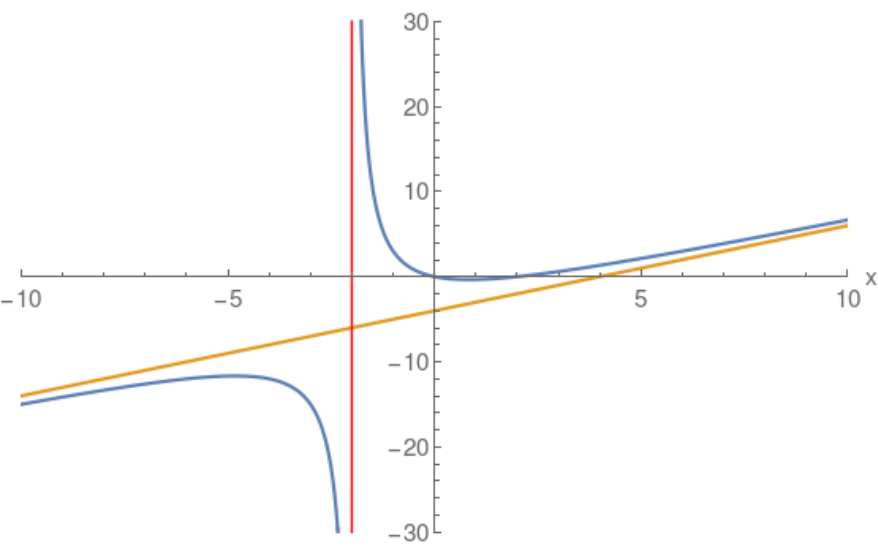
$$
\begin{array}{r|l}
 & +(4) \\
\hline
x-2 & (4)\,x \quad +(-3) \\
 & (4x) \quad +(-8) \\
 & +(5)
\end{array}
$$



Example: Oblique Linear Asymptote

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

$$
\begin{array}{r|l}
 & +(x) \quad +(-4) \\
\hline
x+2 & (1)\,x^2 \quad +(-2)\,x \\
 & (x^2) \quad +(2x) \\
 & +(-4)\,x \\
 & +(-4x) \quad +(-8) \\
 & +(8)
\end{array}
$$



Example: Multiple Vertical Asymptotes

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

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