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.

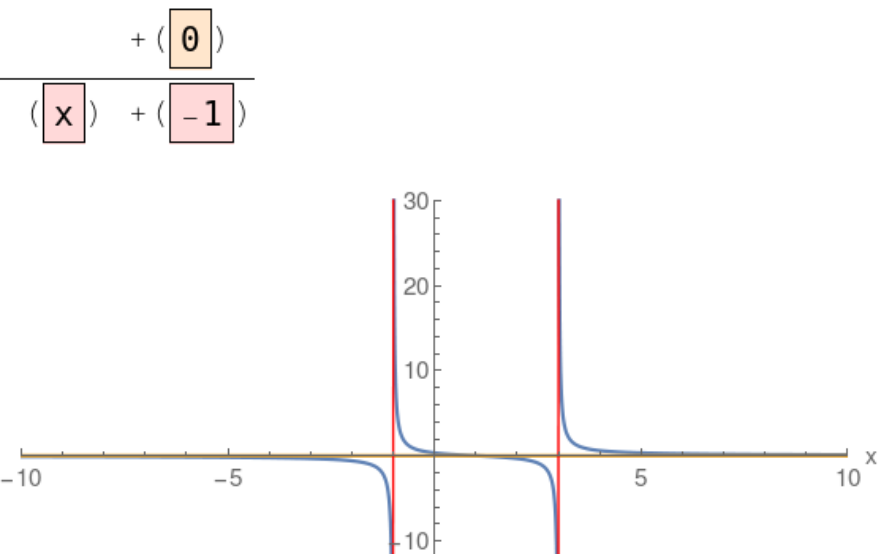
Step 4: Perform a long division to find the quotient which specifies the oblique asymptote.

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

Example: Horizontal Asymptote

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

$$
\begin{array}{ll}
 & +\left(\frac{5}{3}\right) \\
\hline
3x-2 & (5)\,x \quad +(-4) \\
 & \left(5x\right) \quad +\left(-\frac{10}{3}\right) \\
 & +\left(-\frac{2}{3}\right)
\end{array}
$$



Example: Oblique Linear Asymptote

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

$$
\begin{array}{lll}
 & +(x) & +(-5) \\
\hline
x+2 & (1)\,x^2 \quad +(-3)\,x & \\
 & \left(x^2\right) \quad +\left(2x\right) & \\
 & +(-5)\,x & \\
 & +\left(-5x\right) & +\left(-10\right) \\
 & & +(10)
\end{array}
$$

Example: Multiple Vertical Asymptotes

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

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