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.

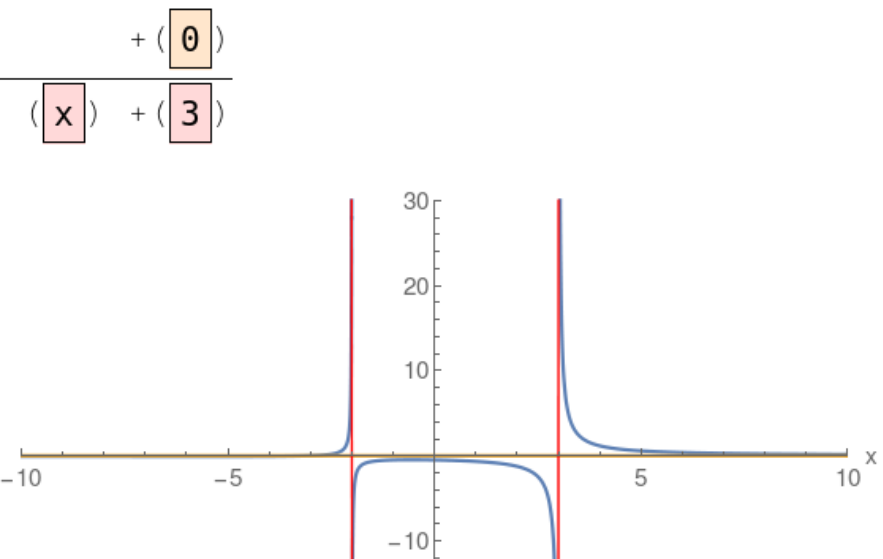
Step 4: Perform a long division to find the quotient which specifies the oblique asymptote.

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

Example: Horizontal Asymptote

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

$$
\begin{array}{lll}
 & & +\left(\frac{2}{5}\right) \\
\hline
5x-4 & (2)\,x & +(-3) \\
 & \left(2x\right) & +\left(-\frac{8}{5}\right) \\
 & & +\left(-\frac{7}{5}\right)
\end{array}
$$



Example: Oblique Linear Asymptote

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

$$
\begin{array}{lll}
 & & +(x) \qquad +(-6) \\
\hline
x+3 & (1)\,x^2 & +(-3)\,x \\
 & \left(x^2\right) & +(3x) \\
 & & +(-6)\,x \\
 & & +(-6x) \qquad +(-18) \\
 & & +(18)
\end{array}
$$

Example: Multiple Vertical Asymptotes

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

$$
\begin{array}{ll}
 & +(0) \\
\hline
(x) & +(3)
\end{array}
$$