# 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.

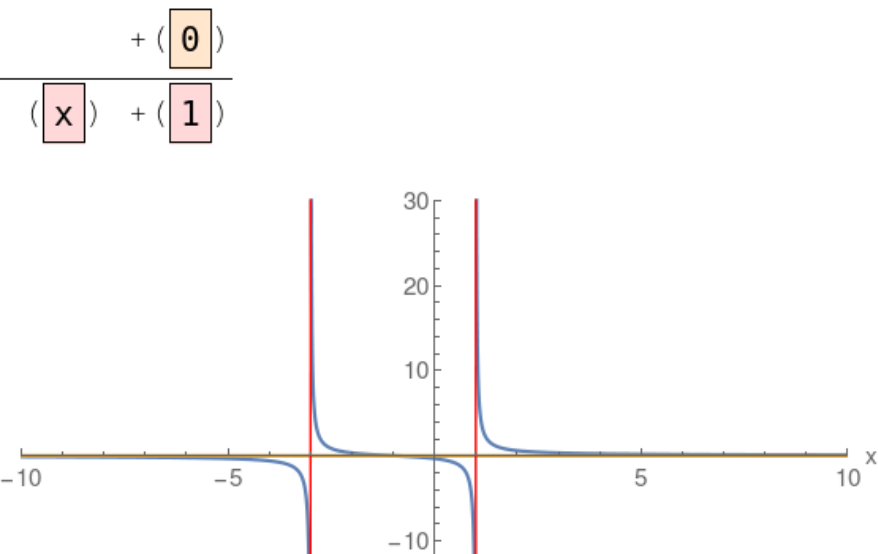
**Step 4:** Perform a long division to find the quotient which specifies the oblique asymptote.

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

## Example: Horizontal Asymptote

$$\frac{4x-2}{5x-1}$$

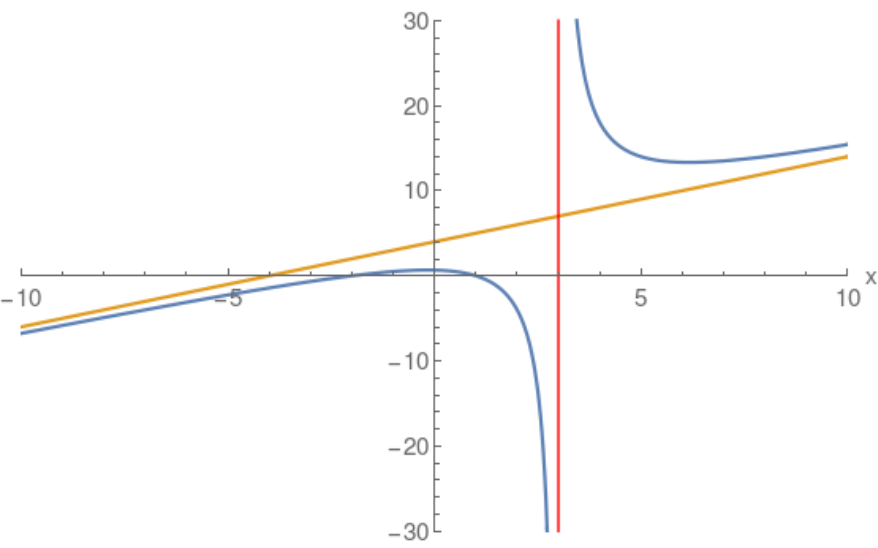
$$\begin{array}{r|l} & +\left(\frac{4}{5}\right) \\ \hline 5x-1 & (4)\,x \quad +(-2) \\ & \left(4x\right) \quad +\left(-\frac{4}{5}\right) \\ & +\left(-\frac{6}{5}\right) \end{array}$$




## Example: Oblique Linear Asymptote

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

$$\begin{array}{r|l} & +(x) \quad +(4) \\ \hline x-3 & (1)\,x^2 \quad +(1)\,x \quad +(-2) \\ & \left(x^2\right) \quad +(-3x) \\ & +(4)\,x \quad +(-2) \\ & +(4x) \quad +(-12) \\ & +(10) \end{array}$$




## Example: Multiple Vertical Asymptotes

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

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