

# 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.

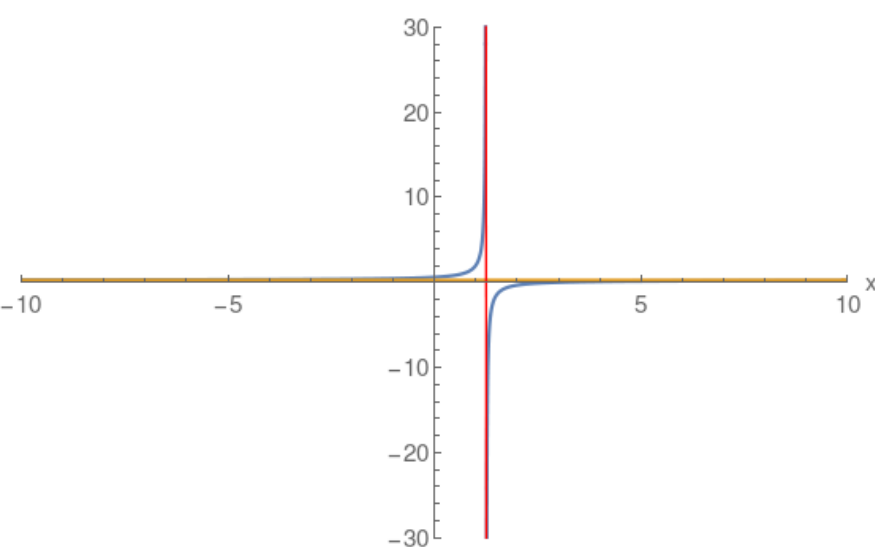
**Step 4:** Perform a long division to find the quotient which specifies the oblique asymptote.

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

## Example: Horizontal Asymptote

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

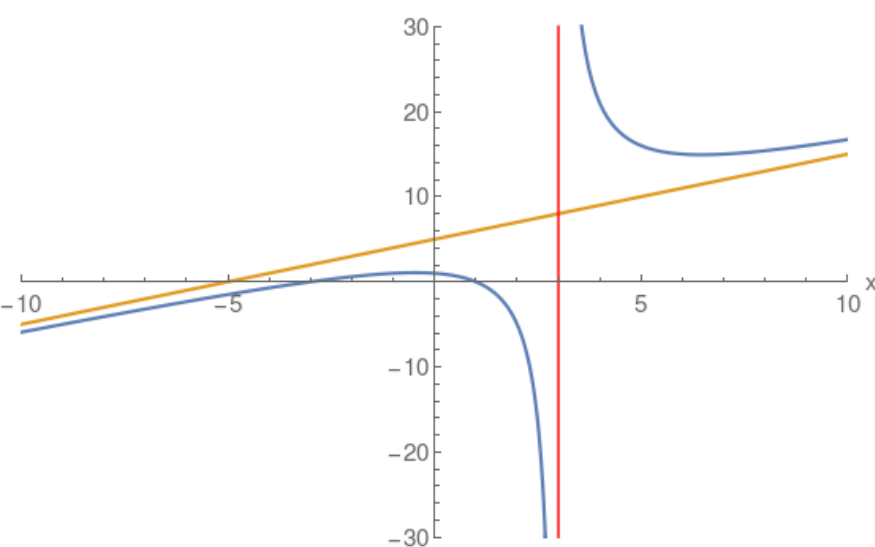
$$\begin{array}{r} + \left( \frac{1}{4} \right) \\ \hline 4x - 5 \quad (1)x + (-3) \\ (x) + \left( -\frac{5}{4} \right) \\ + \left( -\frac{7}{4} \right) \end{array}$$



## Example: Oblique Linear Asymptote

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

$$\begin{array}{r} + \left( x \right) + \left( 5 \right) \\ \hline x - 3 \quad (1)x^2 + (2)x + (-3) \\ (x^2) + (-3x) \\ + (5)x + (-3) \\ + (5x) + (-15) \\ + (12) \end{array}$$



## Example: Multiple Vertical Asymptotes

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

$$\begin{array}{r} + \left( 0 \right) \\ \hline (x) + (-1) \end{array}$$

