

# 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.

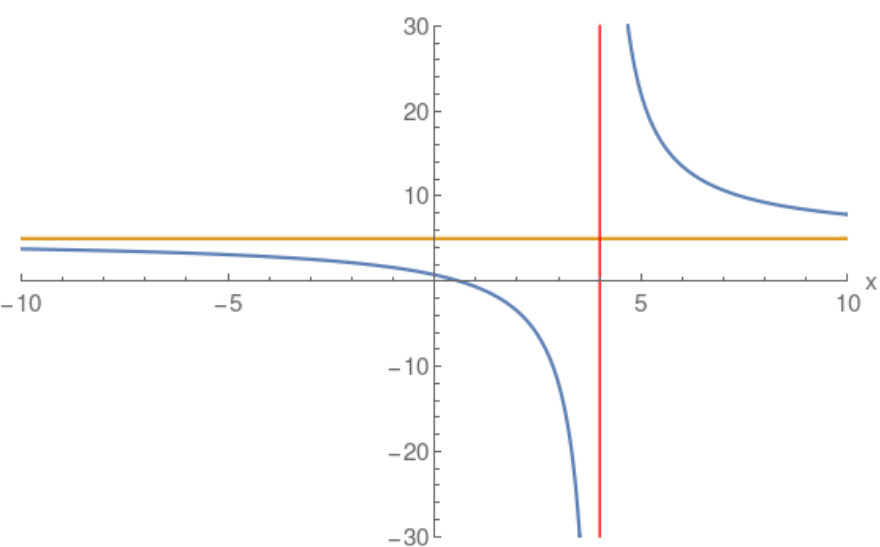
**Step 4:** Perform a long division to find the quotient which specifies the oblique asymptote.

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

## Example: Horizontal Asymptote

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

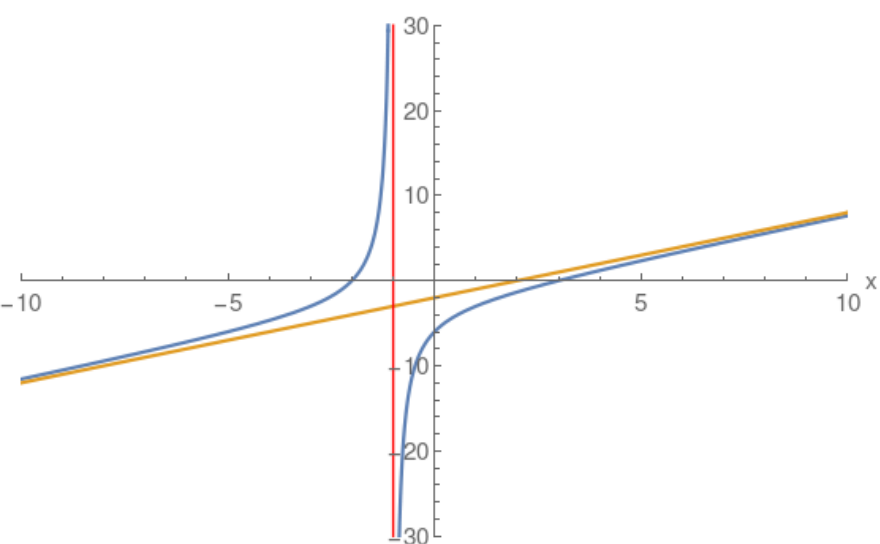
$$\begin{array}{r} \phantom{x-4} + (5) \\ \hline x-4 \quad (5)x + (-3) \\ \phantom{x-4} (5x) + (-20) \\ \phantom{x-4} + (17) \end{array}$$



## Example: Oblique Linear Asymptote

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

$$\begin{array}{r} \phantom{x+1} + (x) + (-2) \\ \hline x+1 \quad (1)x^2 + (-1)x + (-6) \\ \phantom{x+1} (x^2) + (x) \\ \phantom{x+1} + (-2)x + (-6) \\ \phantom{x+1} + (-2x) + (-2) \\ \phantom{x+1} + (-4) \end{array}$$



## Example: Multiple Vertical Asymptotes

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

$$\begin{array}{r} \phantom{(x-3)(x+2)} + (0) \\ \hline (x) + (3) \end{array}$$

