

# 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.

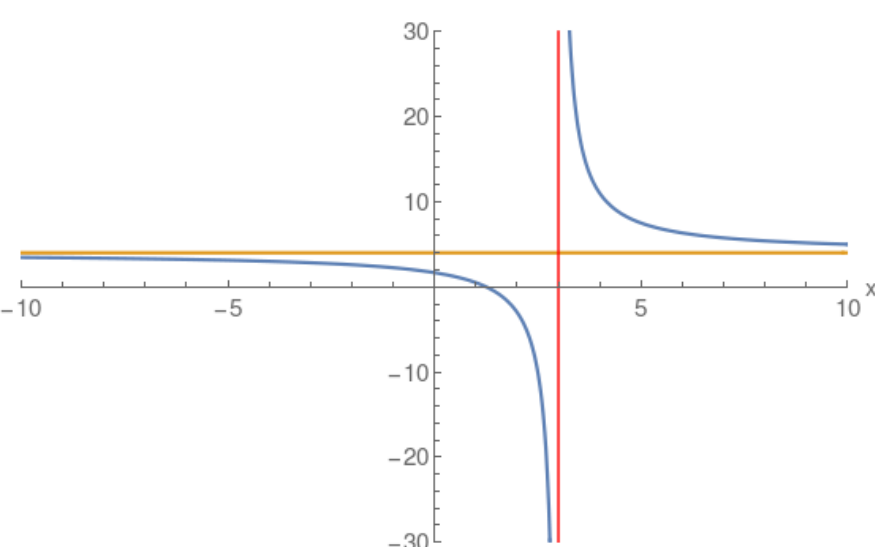
**Step 3:** Set the denominator to 0 to solve for vertical asymptotes.

**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.

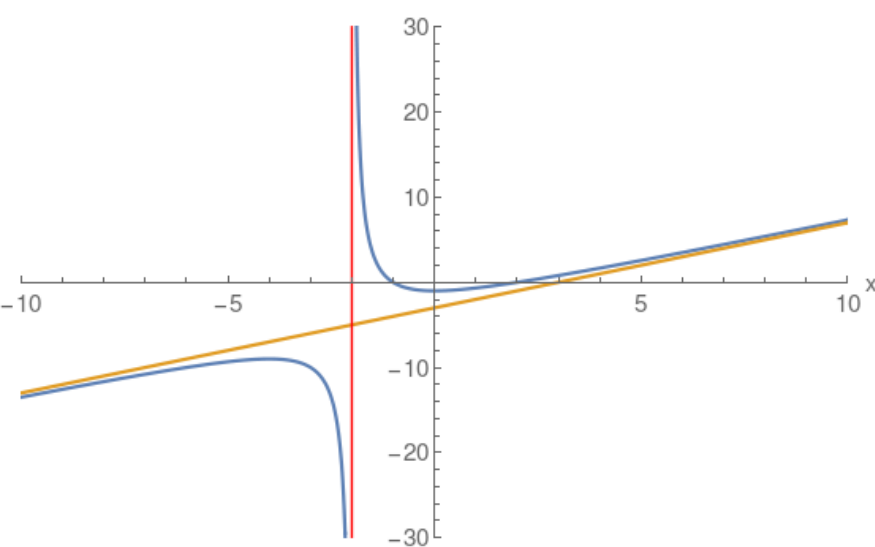
## Example: Horizontal Asymptote

$$\begin{array}{r} \frac{4x-5}{x-3} \\ \underline{x-3 \phantom{00} (4)x + (-5)} \\ (4x) + (-12) \\ \underline{+ (7)} \end{array}$$



## Example: Oblique Linear Asymptote

$$\begin{array}{r} \frac{(x-2)(x+1)}{x+2} \\ \underline{x+2 \phantom{00} (1)x^2 + (-1)x + (-2)} \\ (x^2) + (2x) \\ \underline{+ (-3)x + (-2)} \\ + (-3x) + (-6) \\ \underline{+ (4)} \end{array}$$



## Example: Multiple Vertical Asymptotes

$$\begin{array}{r} \frac{x}{(x-3)(x-1)} \\ \underline{+ (0)} \\ (x) \end{array}$$

