

# 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.

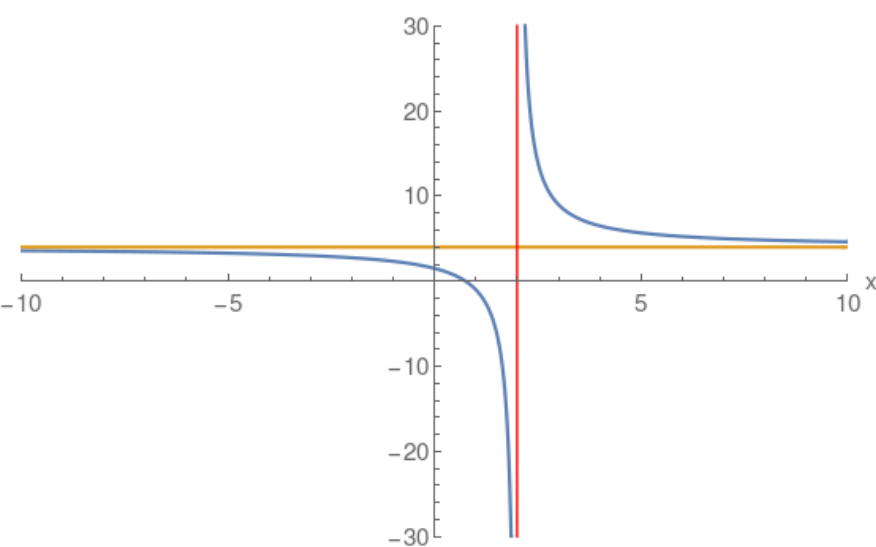
**Step 4:** Perform a long division to find the quotient which specifies the oblique asymptote.

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

## Example: Horizontal Asymptote

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

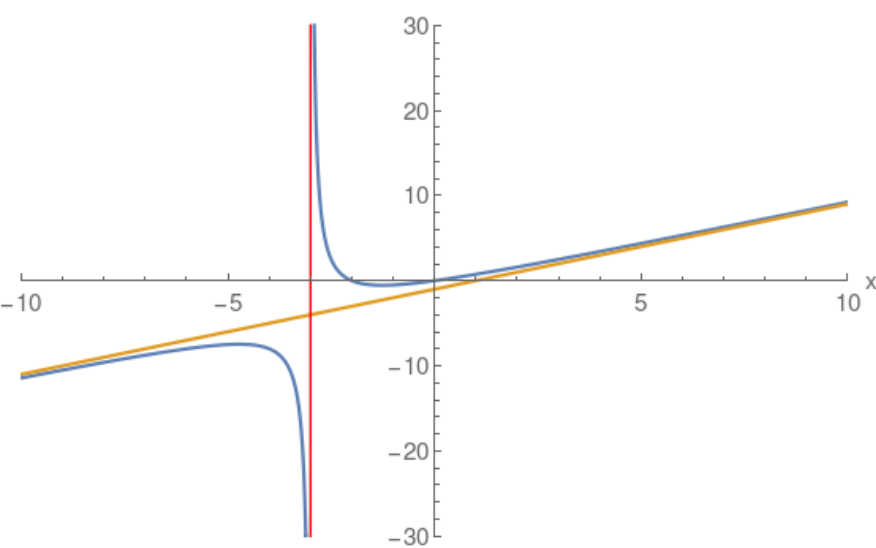
$$\begin{array}{r} \phantom{x-2} + (4) \\ \hline x-2 \quad (4)x + (-3) \\ \phantom{x-2} (4x) + (-8) \\ \phantom{x-2} + (5) \end{array}$$



## Example: Oblique Linear Asymptote

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

$$\begin{array}{r} \phantom{x+3} + (x) + (-1) \\ \hline x+3 \quad (1)x^2 + (2)x \\ \phantom{x+3} (x^2) + (3x) \\ \phantom{x+3} + (-1)x \\ \phantom{x+3} + (-x) + (-3) \\ \phantom{x+3} + (3) \end{array}$$



## Example: Multiple Vertical Asymptotes

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

$$\begin{array}{r} \phantom{(x-3)(x+1)} + (0) \\ \hline (x) + (2) \end{array}$$

