

# 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.

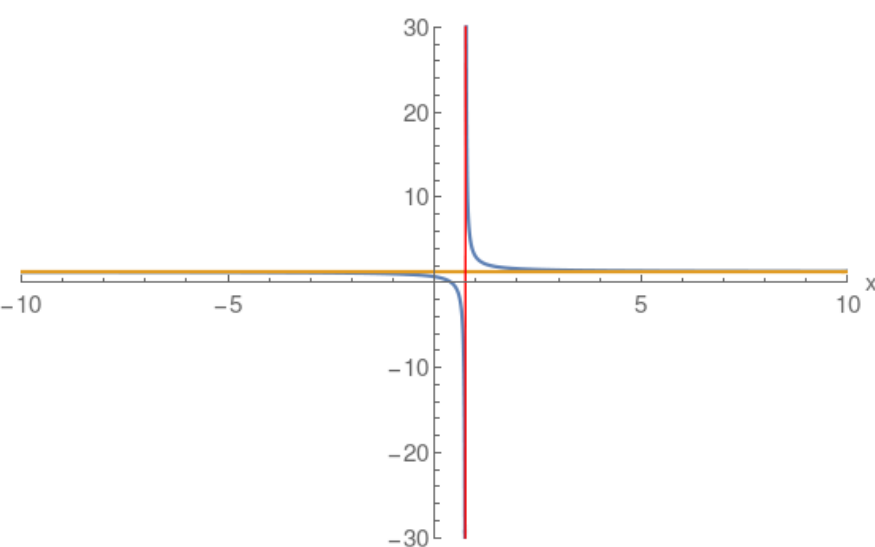
**Note:** Blue curve the actual Rational function.

**Red and Gold asymptotes.**

## Example: Horizontal Asymptote

$$\frac{5x-2}{4x-3}$$

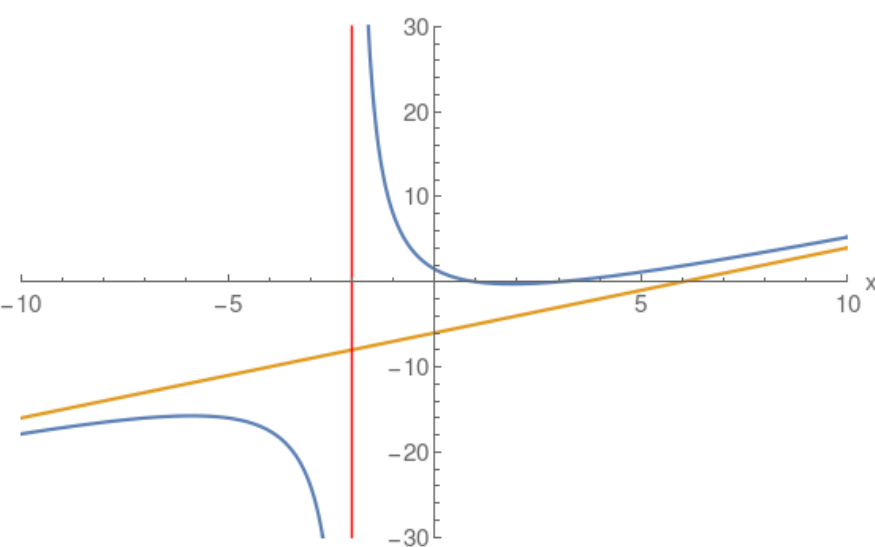
$$\begin{array}{r} + \left( \frac{5}{4} \right) \\ \hline 4x-3 \quad (5)x \quad + (-2) \\ \quad (5x) \quad + \left( -\frac{15}{4} \right) \\ \quad \quad + \left( \frac{7}{4} \right) \end{array}$$



## Example: Oblique Linear Asymptote

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

$$\begin{array}{r} + \left( x \right) \quad + \left( -6 \right) \\ \hline x+2 \quad (1)x^2 \quad + (-4)x \quad + (3) \\ \quad (x^2) \quad + (2x) \\ \quad \quad + (-6)x \quad + (3) \\ \quad \quad + (-6x) \quad + (-12) \\ \quad \quad \quad + (15) \end{array}$$



## Example: Multiple Vertical Asymptotes

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

$$\begin{array}{r} + \left( 0 \right) \\ \hline (x) \quad + (-3) \end{array}$$

