

# 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.

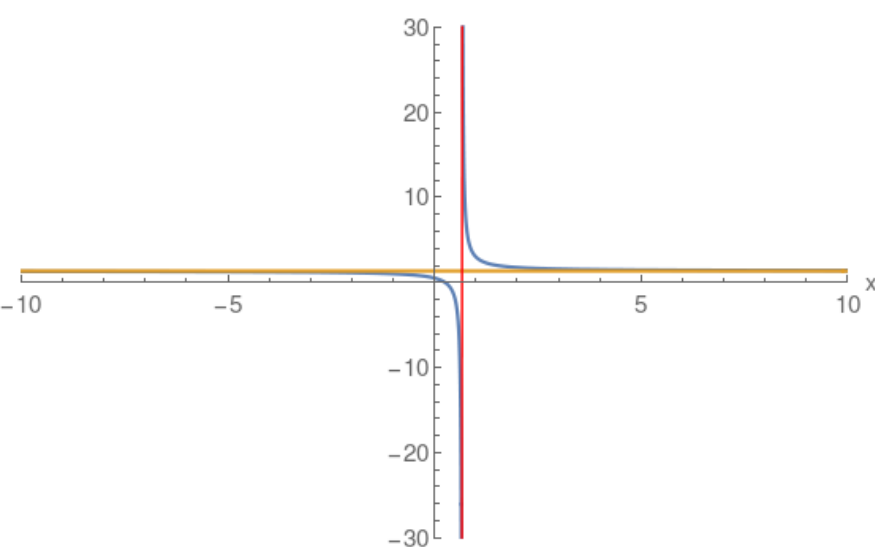
**Note:** Blue curve the actual Rational function.

**Red and Gold asymptotes.**

## Example: Horizontal Asymptote

$$\frac{4x-1}{3x-2}$$

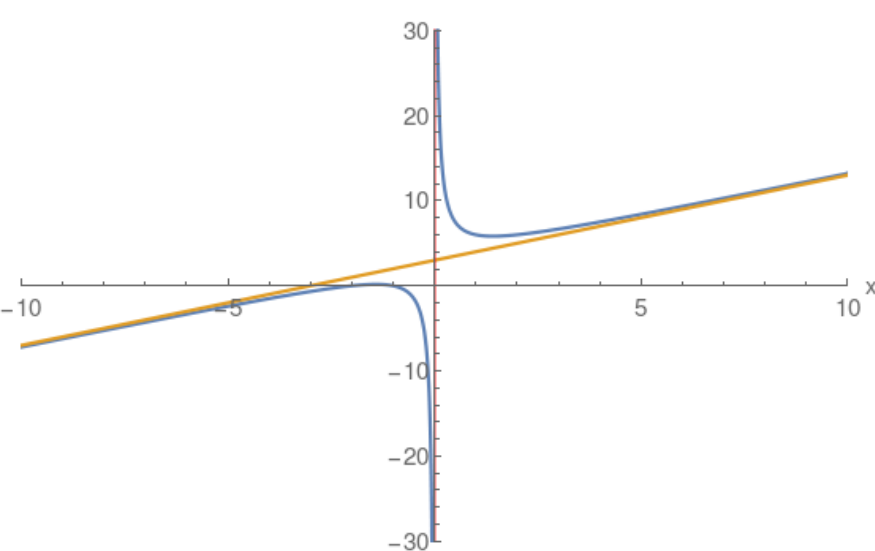
$$\begin{array}{r} + \left( \frac{4}{3} \right) \\ \hline \boxed{3x-2} \quad (4)x + (-1) \\ \quad \quad \quad \left( \frac{4x}{1} \right) + \left( \frac{-8}{3} \right) \\ \quad \quad \quad + \left( \frac{5}{3} \right) \end{array}$$



## Example: Oblique Linear Asymptote

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

$$\begin{array}{r} + \left( \frac{x}{1} \right) + \left( \frac{3}{1} \right) \\ \hline \boxed{x} \quad (1)x^2 + (3)x + (2) \\ \quad \quad \quad \left( \frac{x^2}{1} \right) \\ \quad \quad \quad + (3)x + (2) \\ \quad \quad \quad + \left( \frac{3x}{1} \right) \\ \quad \quad \quad + \left( \frac{2}{1} \right) \end{array}$$



## Example: Multiple Vertical Asymptotes

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

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

