

# 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.

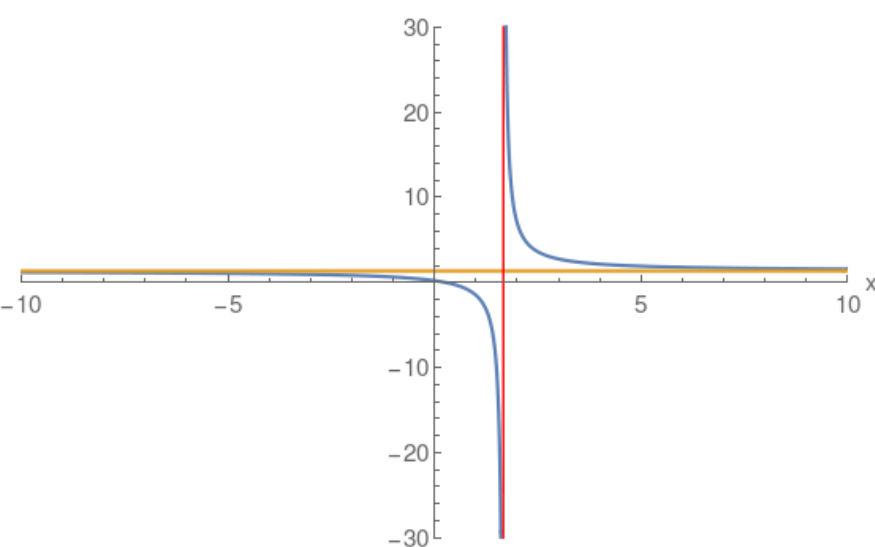
**Note:** Blue curve the actual Rational function.

**Red and Gold asymptotes.**

## Example: Horizontal Asymptote

$$\frac{4x-1}{3x-5}$$

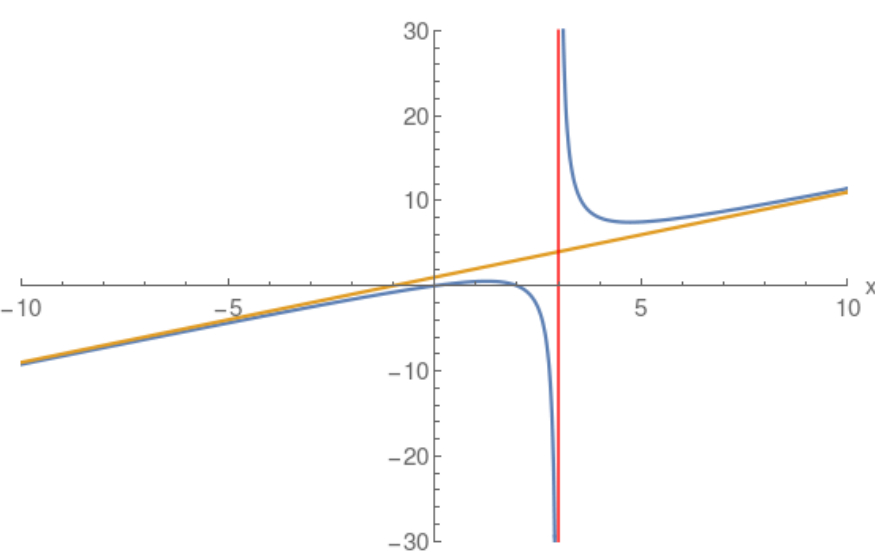
$$\begin{array}{r} + \left( \frac{4}{3} \right) \\ \hline \boxed{3x-5} \quad (4)x + (-1) \\ \quad \quad \quad \left( \frac{4x}{1} \right) + \left( \frac{-20}{3} \right) \\ \quad \quad \quad + \left( \frac{17}{3} \right) \end{array}$$



## Example: Oblique Linear Asymptote

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

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



## Example: Multiple Vertical Asymptotes

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

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

