

# 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.

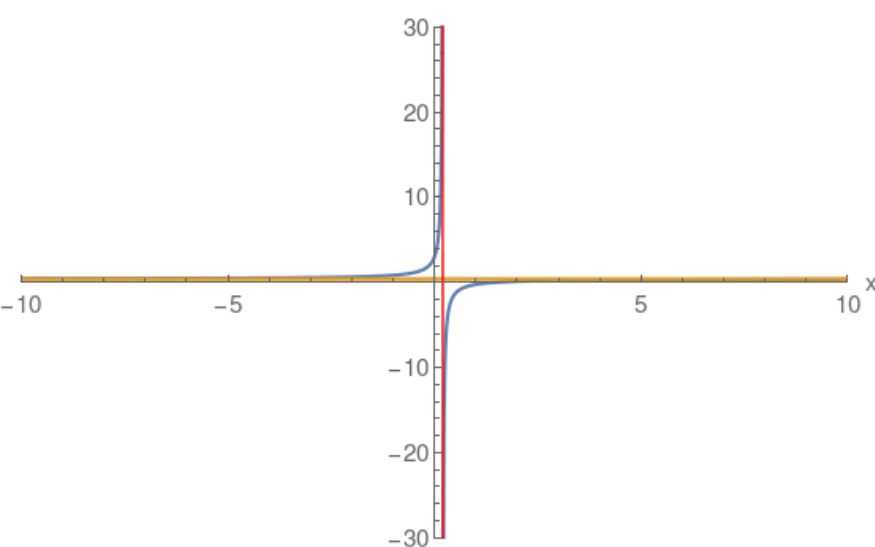
**Note:** Blue curve the actual Rational function.

**Red and Gold asymptotes.**

## Example: Horizontal Asymptote

$$\frac{2x-3}{5x-1}$$

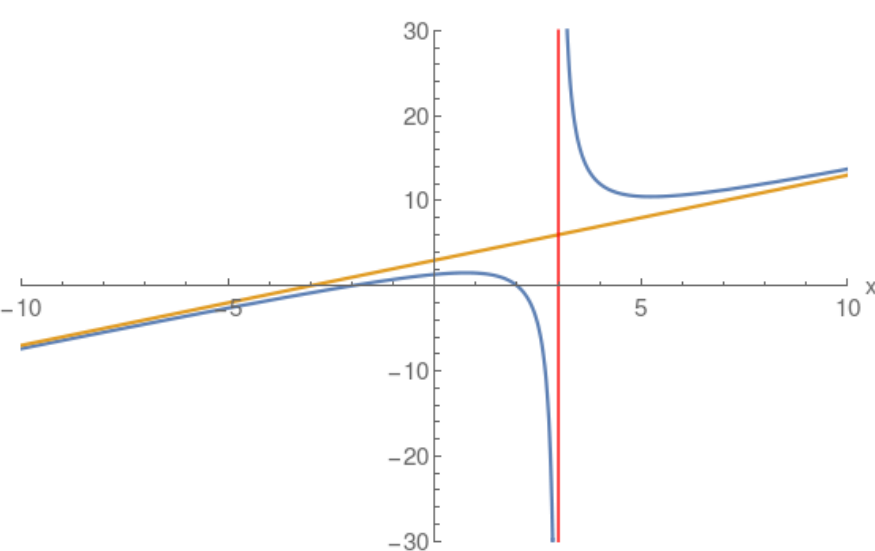
$$\begin{array}{r} + \left( \frac{2}{5} \right) \\ \hline 5x - 1 \quad (2)x + (-3) \\ \quad (2x) + \left( -\frac{2}{5} \right) \\ \quad \quad + \left( -\frac{13}{5} \right) \end{array}$$



## Example: Oblique Linear Asymptote

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

$$\begin{array}{r} + \left( x \right) + \left( 3 \right) \\ \hline x - 3 \quad (1)x^2 + (-4) \\ \quad (x^2) + (-3x) \\ \quad \quad + (3)x + (-4) \\ \quad \quad + (3x) + (-9) \\ \quad \quad \quad + (5) \end{array}$$



## Example: Multiple Vertical Asymptotes

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

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

