

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.

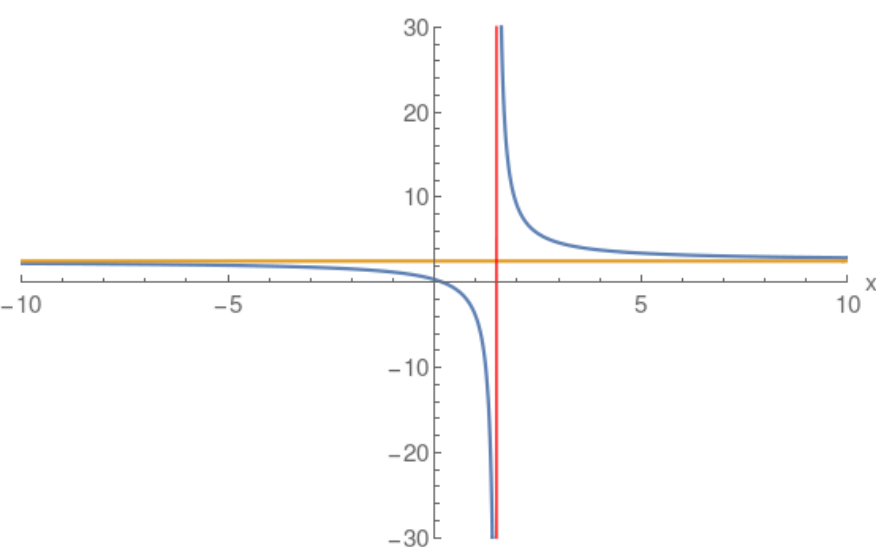
Note: Blue curve the actual Rational function.

Red and Gold asymptotes.

Example: Horizontal Asymptote

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

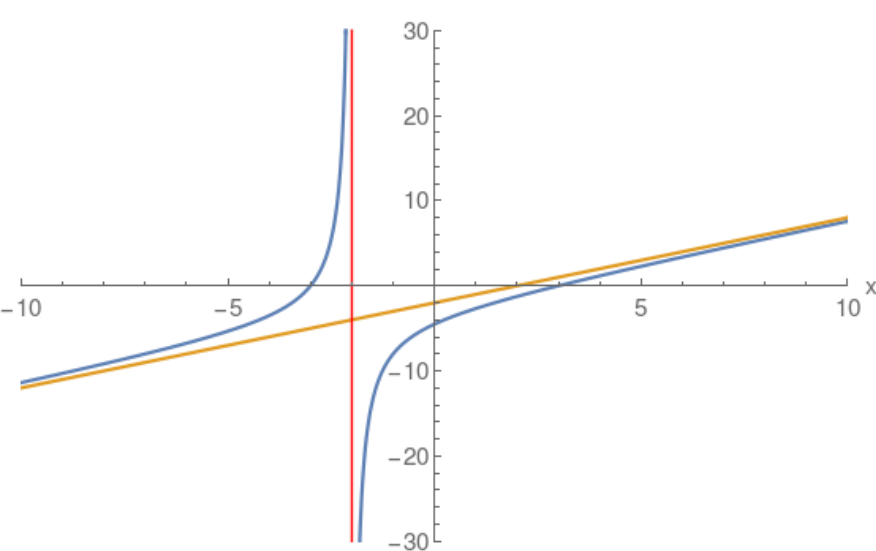
$$\begin{array}{r} + \left(\frac{5}{2} \right) \\ \hline \boxed{2x-3} \quad (5)x \quad + (-1) \\ \quad \quad \quad \left(\frac{5x}{1} \right) + \left(\frac{-15}{2} \right) \\ \quad \quad \quad + \left(\frac{13}{2} \right) \end{array}$$



Example: Oblique Linear Asymptote

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

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



Example: Multiple Vertical Asymptotes

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

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

