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.

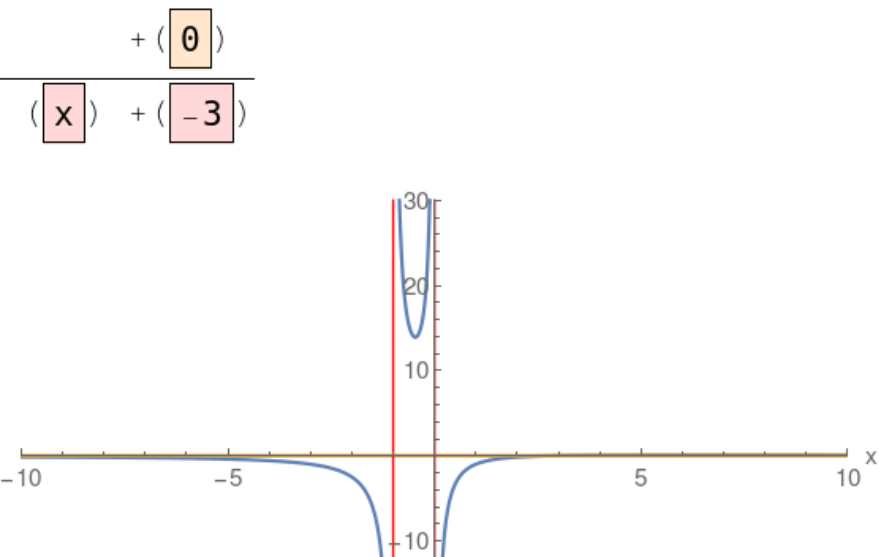
Step 4: Perform a long division to find the quotient which specifies the oblique asymptote.

Note: Blue curve the actual Rational function.
Red and Gold asymptotes.

Example: Horizontal Asymptote

$$\frac{4x-1}{2x-5}$$

$$\begin{array}{r|l} & +(2) \\ \hline 2x-5 & (4)\,x \quad +(-1) \\ & (4x) \quad +(-10) \\ & \quad +(9) \end{array}$$



Example: Oblique Linear Asymptote

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

$$\begin{array}{r|l} & +(x) \quad +(6) \\ \hline x-3 & (1)\,x^2 \quad +(3)\,x \quad +(2) \\ & (x^2) \quad +(-3x) \\ & \quad +(6)\,x \quad +(2) \\ & \quad +(6x) \quad +(-18) \\ & \qquad\quad +(20) \end{array}$$

Example: Multiple Vertical Asymptotes

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

$$\begin{array}{r|l} & +(0) \\ \hline (x) & +(-3) \end{array}$$