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

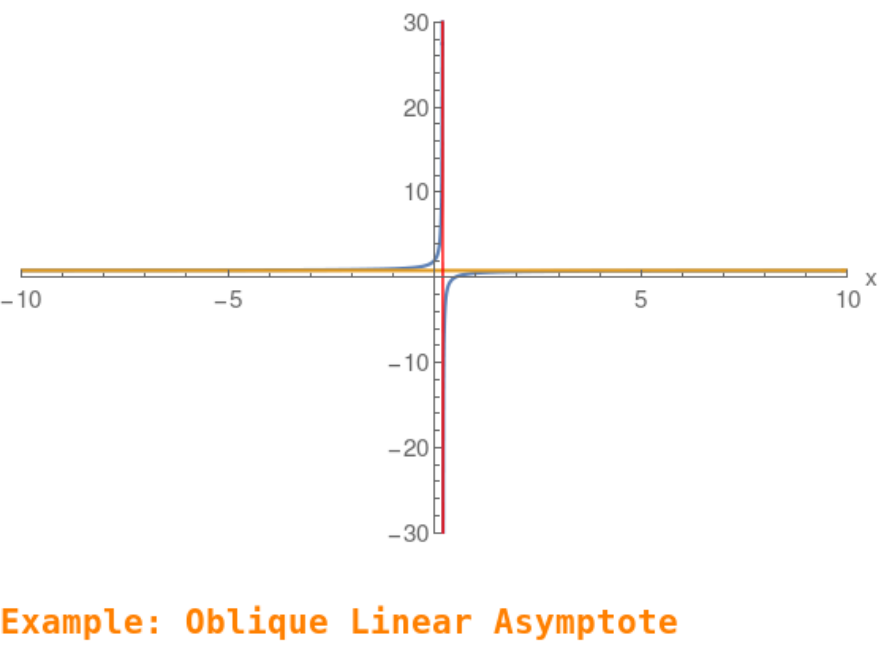
$$\frac{4x-2}{5x-1}$$

$$+\left(\frac{4}{5}\right)$$

$$5x-1 \quad (4)x \quad +(-2)$$

$$\left(4x\right) \quad +\left(-\frac{4}{5}\right)$$

$$+\left(-\frac{6}{5}\right)$$



Example: Oblique Linear Asymptote

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

$$+\left(x\right) \qquad +\left(1\right)$$

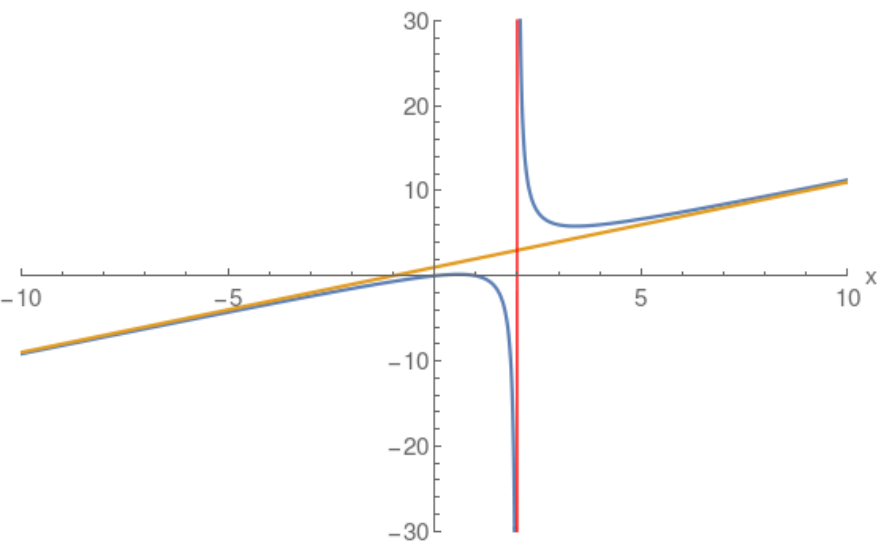
$$x-2 \quad (1)x^2 \quad +(-1)x$$

$$\left(x^2\right) \quad +\left(-2x\right)$$

$$+(1)x$$

$$+\left(x\right) \qquad +\left(-2\right)$$

$$+\left(2\right)$$



Example: Multiple Vertical Asymptotes

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

$$+\left(0\right)$$

$$\left(x\right) \quad +\left(3\right)$$