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

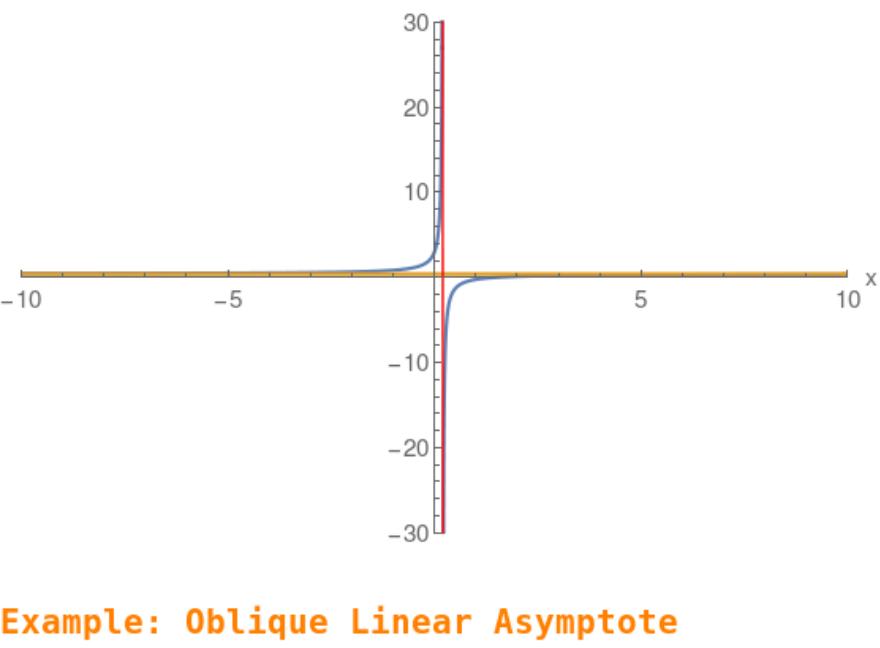
$$\frac{2x-3}{5x-1}$$

$$+\left(\frac{2}{5}\right)$$

$$5x-1 \quad (2)x + (-3)$$

$$\left(2x\right) + \left(-\frac{2}{5}\right)$$

$$+\left(-\frac{13}{5}\right)$$



Example: Oblique Linear Asymptote

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

$$+\left(x\right) \qquad +\left(-5\right)$$

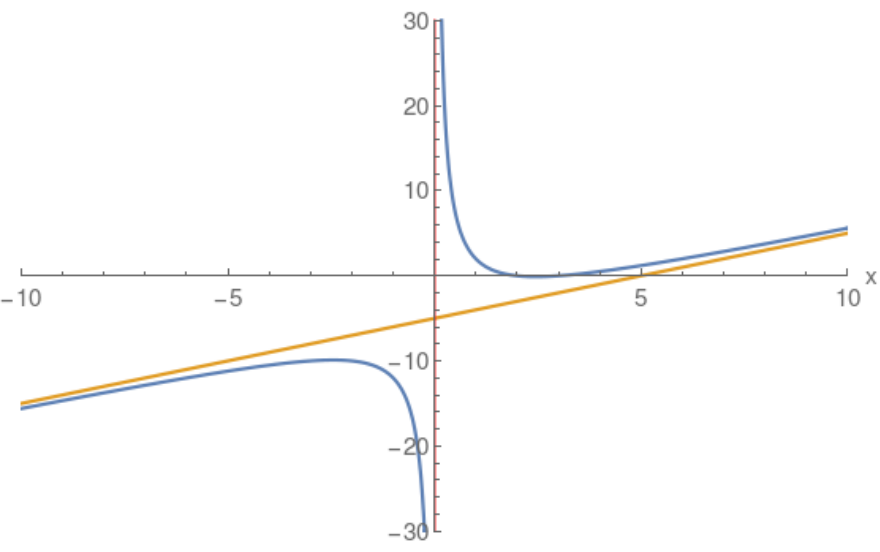
$$x \quad (1)x^2 + (-5)x + (6)$$

$$\left(x^2\right)$$

$$+(-5)x + (6)$$

$$+\left(-5x\right)$$

$$+\left(6\right)$$



Example: Multiple Vertical Asymptotes

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

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

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