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

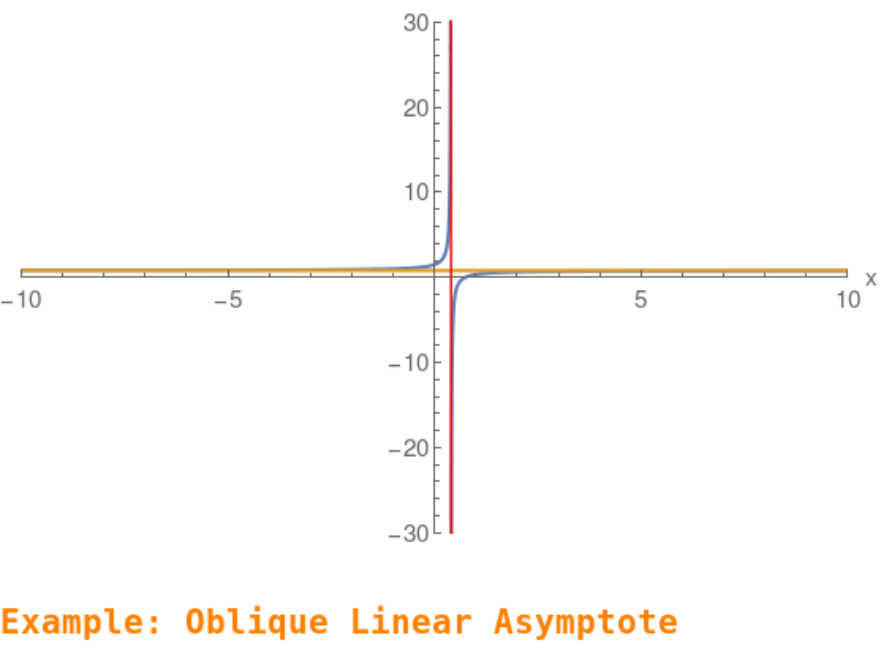
$$\frac{4x-3}{5x-2}$$

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

$$\boxed{5x-2} \quad (4)x \quad +(-3)$$

$$\left(\boxed{4x}\right) \quad +\left(\boxed{-\frac{8}{5}}\right)$$

$$+\left(\boxed{-\frac{7}{5}}\right)$$



Example: Oblique Linear Asymptote

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

$$+\left(\boxed{x}\right) \quad +\left(\boxed{1}\right)$$

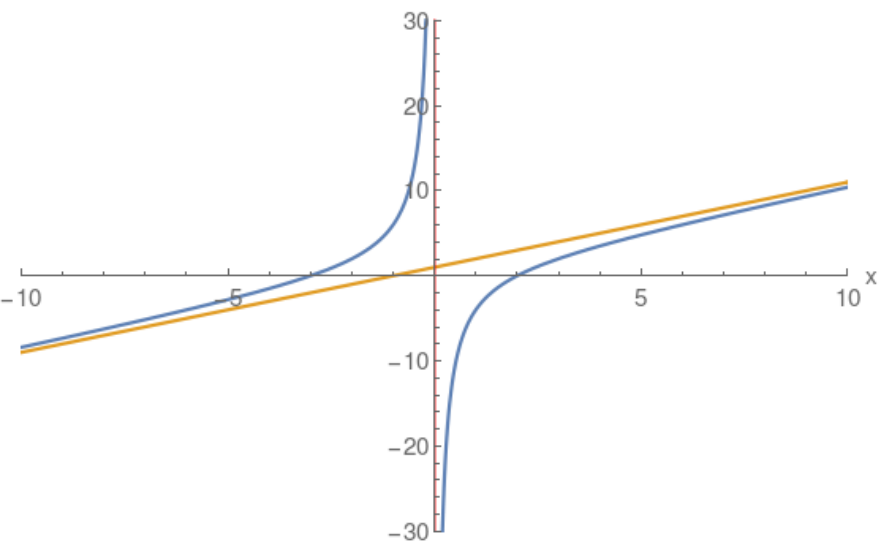
$$\boxed{x} \quad (1)x^2 \quad +(1)x \quad +(-6)$$

$$\left(\boxed{x^2}\right)$$

$$+(1)x \quad +(-6)$$

$$+\left(\boxed{x}\right)$$

$$+\left(\boxed{-6}\right)$$



Example: Multiple Vertical Asymptotes

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

$$+\left(\boxed{0}\right)$$

$$\left(\boxed{x}\right) \quad +\left(\boxed{-1}\right)$$