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

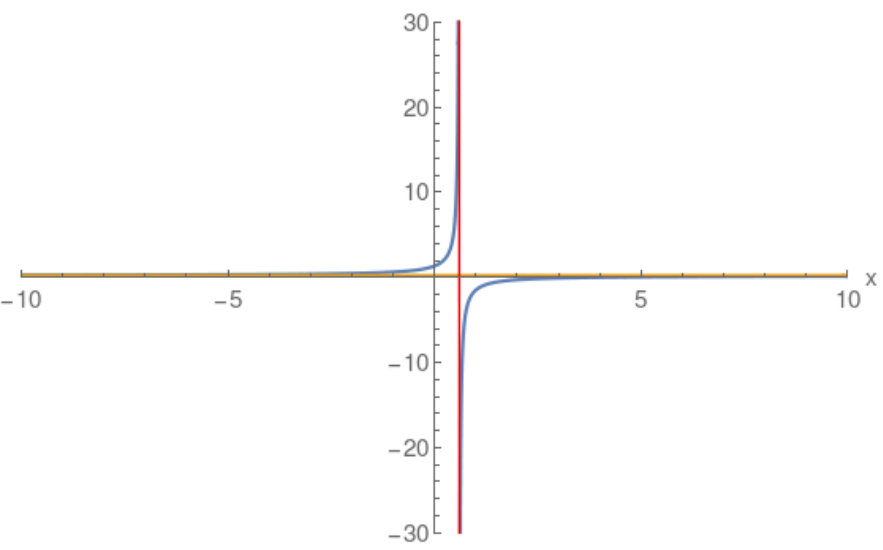
$$\frac{x-4}{5x-3}$$

$$+\left(\boxed{\frac{1}{5}}\right)$$

$$\boxed{5x-3} \quad (1)x + (-4)$$

$$\left(\boxed{x}\right) + \left(\boxed{-\frac{3}{5}}\right)$$

$$+\left(\boxed{-\frac{17}{5}}\right)$$



Example: Oblique Linear Asymptote

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

$$+\left(\boxed{x}\right) \qquad +\left(\boxed{2}\right)$$

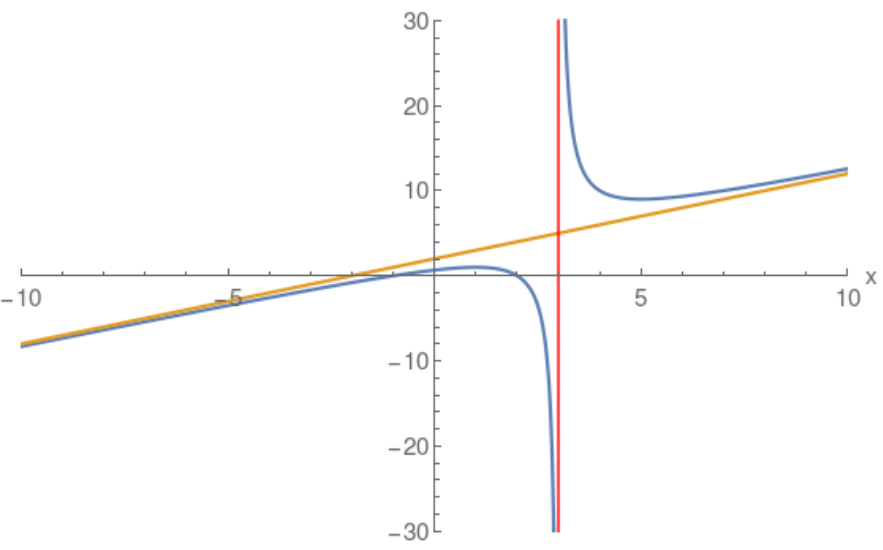
$$\boxed{x-3} \quad (1)x^2 + (-1)x \qquad + (-2)$$

$$\left(\boxed{x^2}\right) + \left(\boxed{-3x}\right)$$

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

$$+\left(\boxed{2x}\right) \qquad +\left(\boxed{-6}\right)$$

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



Example: Multiple Vertical Asymptotes

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

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

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