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

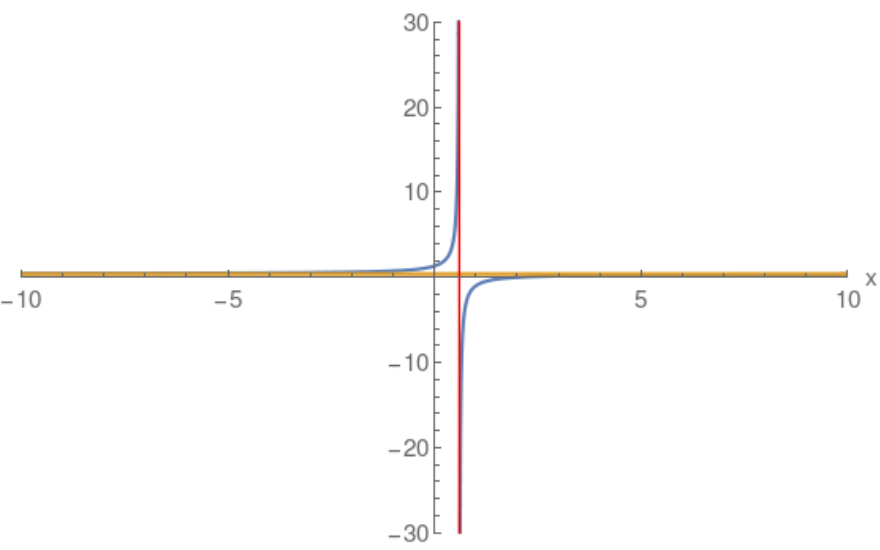
$$\frac{2x-4}{5x-3}$$

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

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

$$\left(2x\right) + \left(-\frac{6}{5}\right)$$

$$+\left(-\frac{14}{5}\right)$$



Example: Oblique Linear Asymptote

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

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

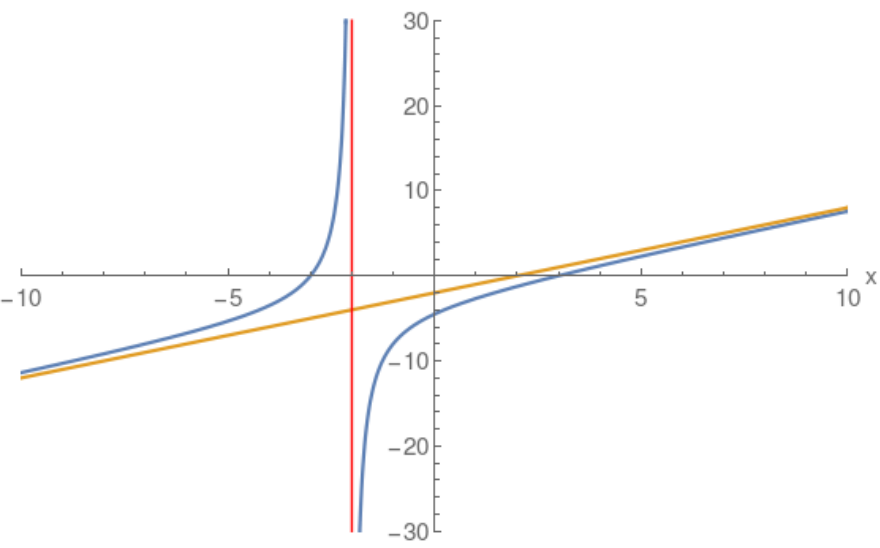
$$x+2 \quad (1)x^2 \qquad\qquad + (-9)$$

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

$$+(-2)x \qquad + (-9)$$

$$+\left(-2x\right) \qquad +\left(-4\right)$$

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



Example: Multiple Vertical Asymptotes

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

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

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