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

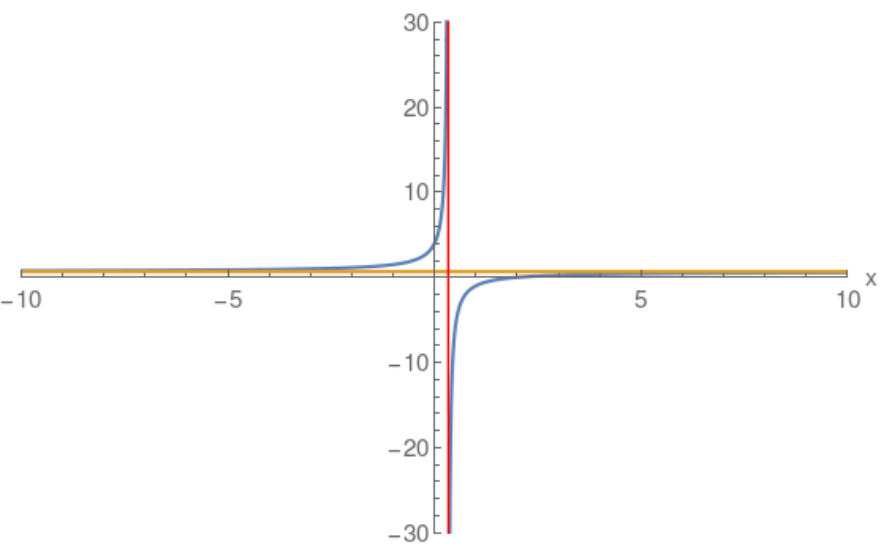
$$\frac{2x-4}{3x-1}$$

$$+\left(\frac{2}{3}\right)$$

$$3x-1 \quad (2)x + (-4)$$

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

$$+\left(-\frac{10}{3}\right)$$



Example: Oblique Linear Asymptote

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

$$+(x) \qquad +(-3)$$

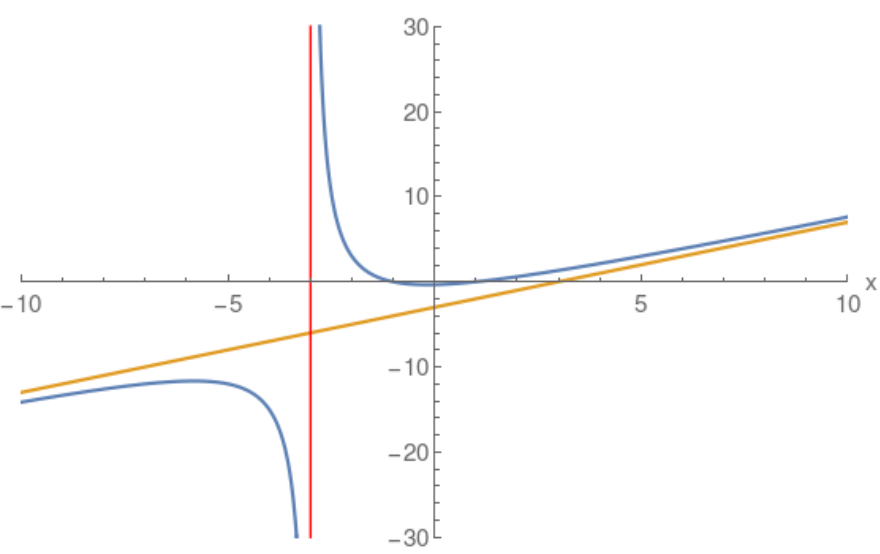
$$x+3 \quad (1)x^2 + (-1)$$

$$\left(x^2\right) + (3x)$$

$$+(-3)x + (-1)$$

$$+(-3x) + (-9)$$

$$+(8)$$



Example: Multiple Vertical Asymptotes

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

$$+(0)$$

$$(x) + (-1)$$