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

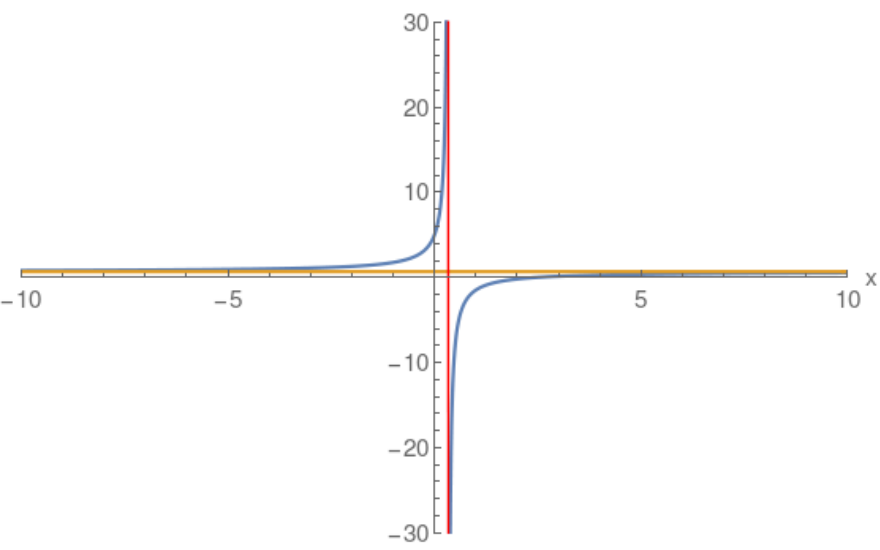
$$\frac{2x-5}{3x-1}$$

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

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

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

$$+\left(-\frac{13}{3}\right)$$



Example: Oblique Linear Asymptote

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

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

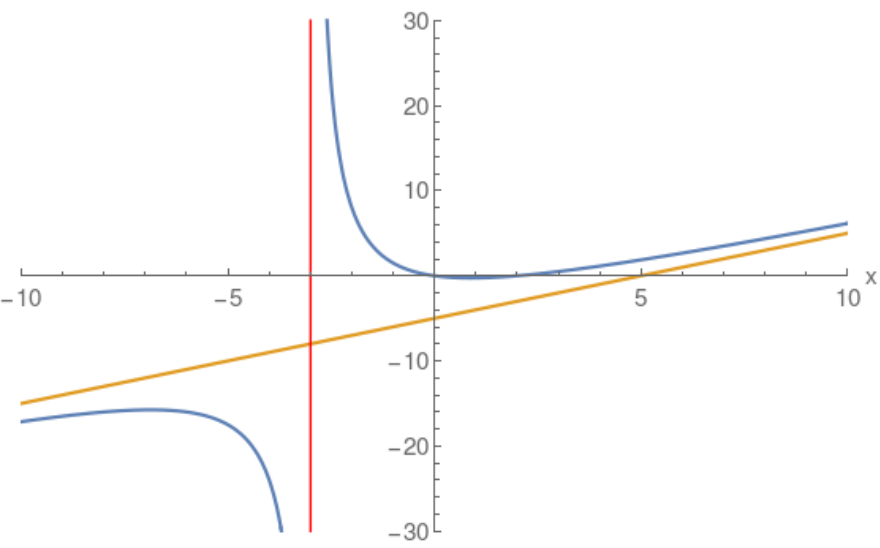
$$x+3 \quad (1)x^2 + (-2)x$$

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

$$+(-5)x$$

$$+\left(-5x\right) + \left(-15\right)$$

$$+\left(15\right)$$



Example: Multiple Vertical Asymptotes

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

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

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