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.
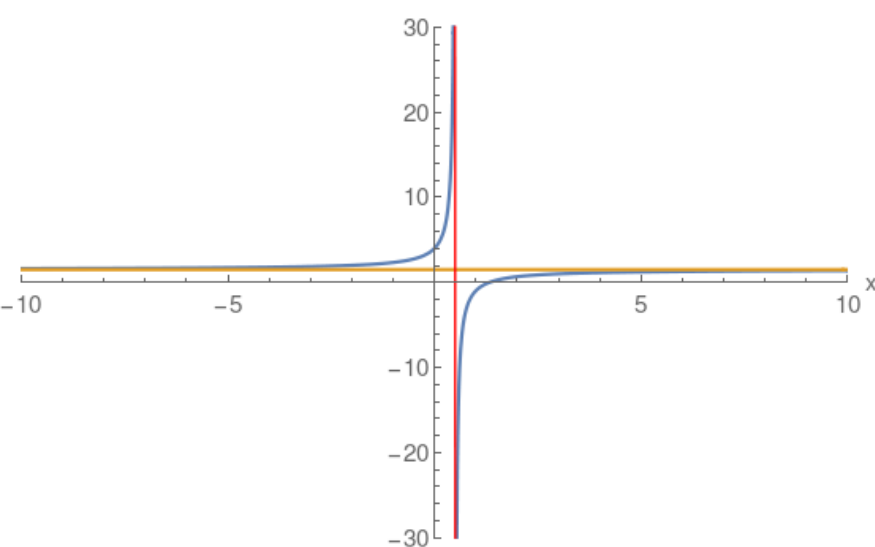**Step 3:** Set the denominator to 0 to solve for vertical asymptotes.
Step 4: Perform a long division to find the quotient which specifies the oblique asymptote.

Note: Blue curve the actual Rational function.
Red and Gold asymptotes.

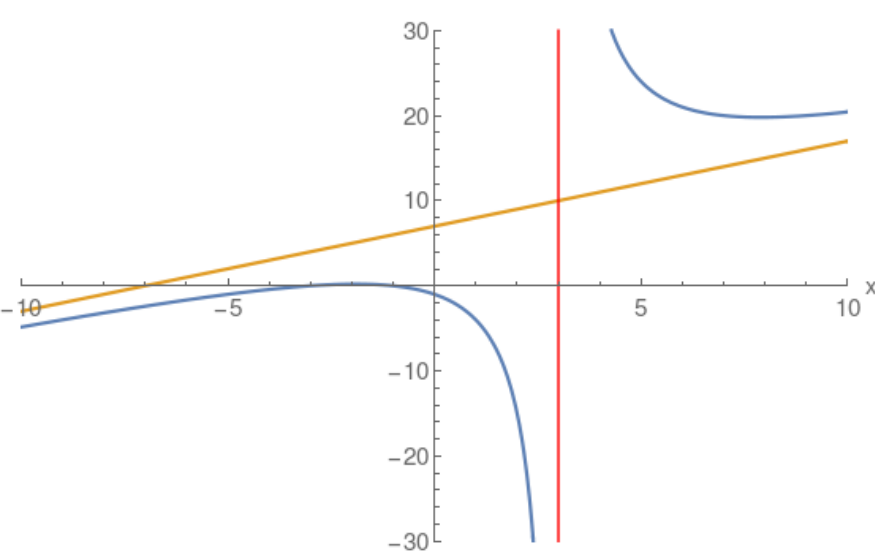## Example: Horizontal Asymptote

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

$$+ \left(\boxed{\tfrac{3}{2}} \right)$$

$$\boxed{2\,x-1} \quad (3)\,x \quad +(-4)$$

$$\left(\boxed{3\,x} \right) \quad +\left(\boxed{-\tfrac{3}{2}} \right)$$

$$+\left(\boxed{-\tfrac{5}{2}} \right)$$

Example: Oblique Linear Asymptote

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

$$+ \left(\boxed{x} \right) \quad\quad + \left(\boxed{7} \right)$$

$$\boxed{x-3} \quad (1)\,x^2 \quad +(4)\,x \quad +(3)$$

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

$$+(7)\,x \quad\quad +(3)$$

$$+\left(\boxed{7\,x} \right) \quad +\left(\boxed{-21} \right)$$

$$+\left(\boxed{24} \right)$$

Example: Multiple Vertical Asymptotes

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

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

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