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.
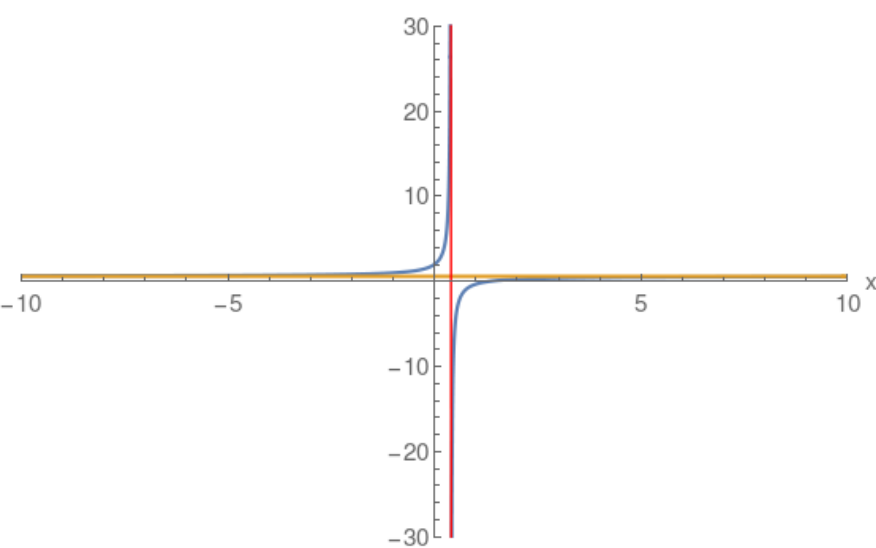**Step 4:** Perform a long division to find the quotient which specifies the oblique asymptote.

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

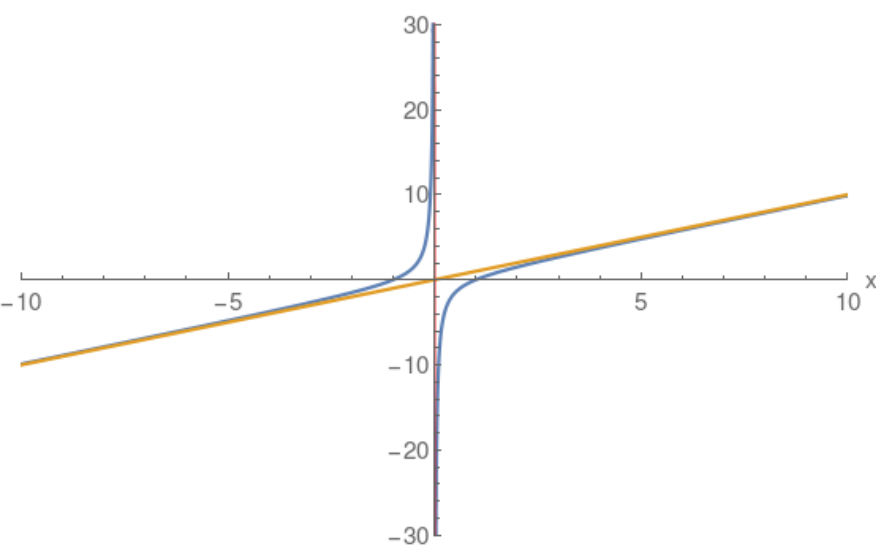## Example: Horizontal Asymptote

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

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

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

$$\left(\boxed{3x} \right) \quad + \left(\boxed{-\frac{6}{5}} \right)$$

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

Example: Oblique Linear Asymptote

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

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

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

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

$$+ \left(\boxed{-1} \right)$$

Example: Multiple Vertical Asymptotes

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

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

$$\left(\boxed{x} \right) \quad + \left(\boxed{-1} \right)$$