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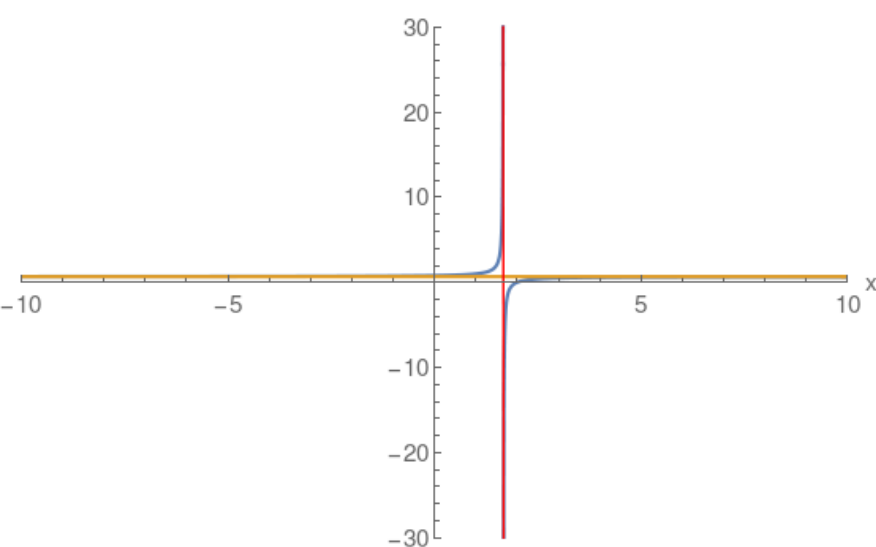**Step 4:** Perform a long division to find the quotient which specifies the oblique asymptote.

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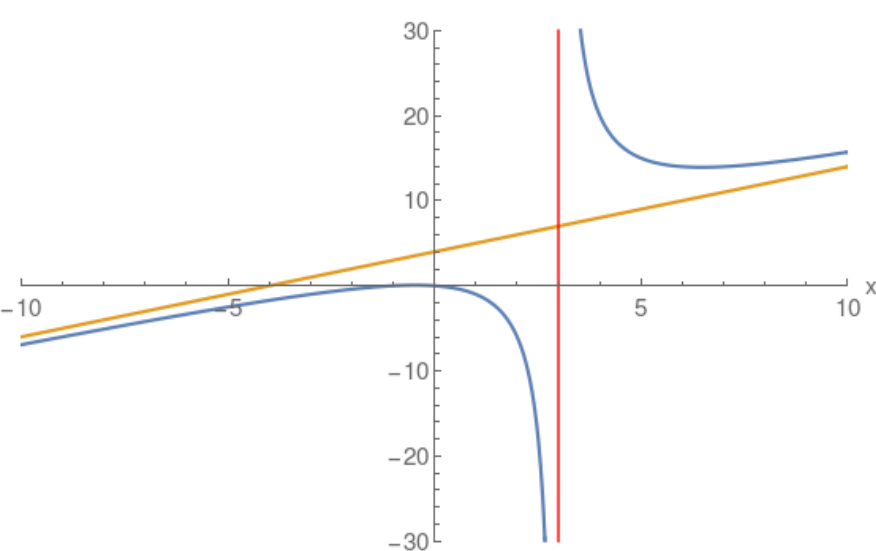**Red and Gold asymptotes.**

Example: Horizontal Asymptote

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

$$
\begin{array}{r}
+ \left(\boxed{\tfrac{2}{3}}\right) \\
\hline
\boxed{3\,x-5} \quad (2)\,x \quad + (-4) \\
(\boxed{2\,x}) \quad + \left(\boxed{-\tfrac{10}{3}}\right) \\
+ \left(\boxed{-\tfrac{2}{3}}\right)
\end{array}
$$

Example: Oblique Linear Asymptote

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

$$
\begin{array}{r}
+ (\boxed{x}) \qquad + \boxed{4} \\
\hline
\boxed{x-3} \quad (1)\,x^2 \quad + (1)\,x \\
(\boxed{x^2}) \quad + (\boxed{-3\,x}) \\
+ (4)\,x \\
+ (\boxed{4\,x}) \quad + (\boxed{-12}) \\
+ (\boxed{12})
\end{array}
$$

Example: Multiple Vertical Asymptotes

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

$$
\begin{array}{r}
+ (\boxed{0}) \\
\hline
(\boxed{x}) \quad + (\boxed{3})
\end{array}
$$