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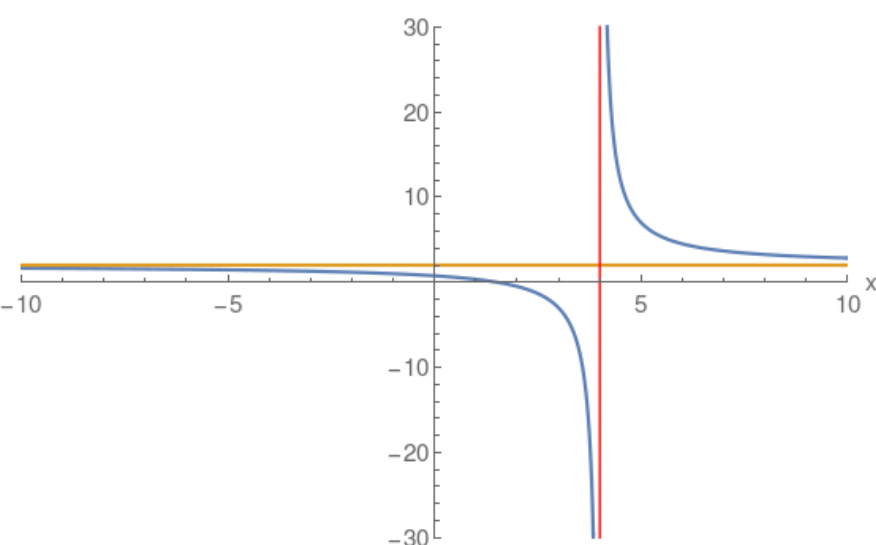**Step 4:** Perform a long division to find the quotient which specifies the oblique asymptote.

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

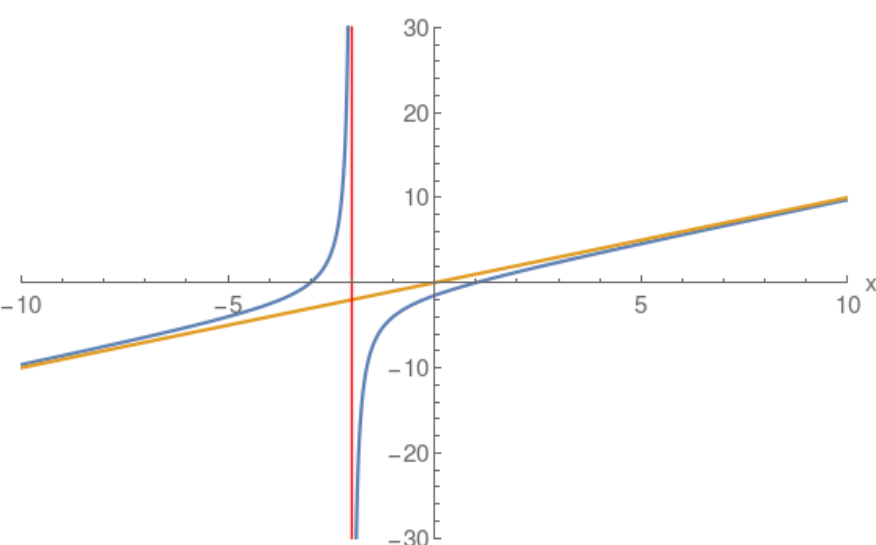## Example: Horizontal Asymptote

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

$$
\begin{array}{r r l}
 & & + (\;\boxed{2}\;) \\
\hline
\boxed{x-4} & (2)\,x & + (-3) \\
 & (\boxed{2x})\!) & + (\boxed{-8}\!) \\
 & & + (\;\boxed{5}\;)
\end{array}
$$

Example: Oblique Linear Asymptote

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

$$
\begin{array}{r r l l}
 & & + (\;\boxed{x}\;) & \\
\hline
\boxed{x+2} & (1)\,x^2 & + (2)\,x & + (-3) \\
 & (\boxed{x^2}\!) & + (\boxed{2x}\!) & \\
 & & + (\;\boxed{-3}\;) &
\end{array}
$$

Example: Multiple Vertical Asymptotes

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

$$
\begin{array}{r l}
 & + (\;\boxed{0}\;) \\
\hline
(\boxed{x}\!) & + (\boxed{-1}\!)
\end{array}
$$