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.

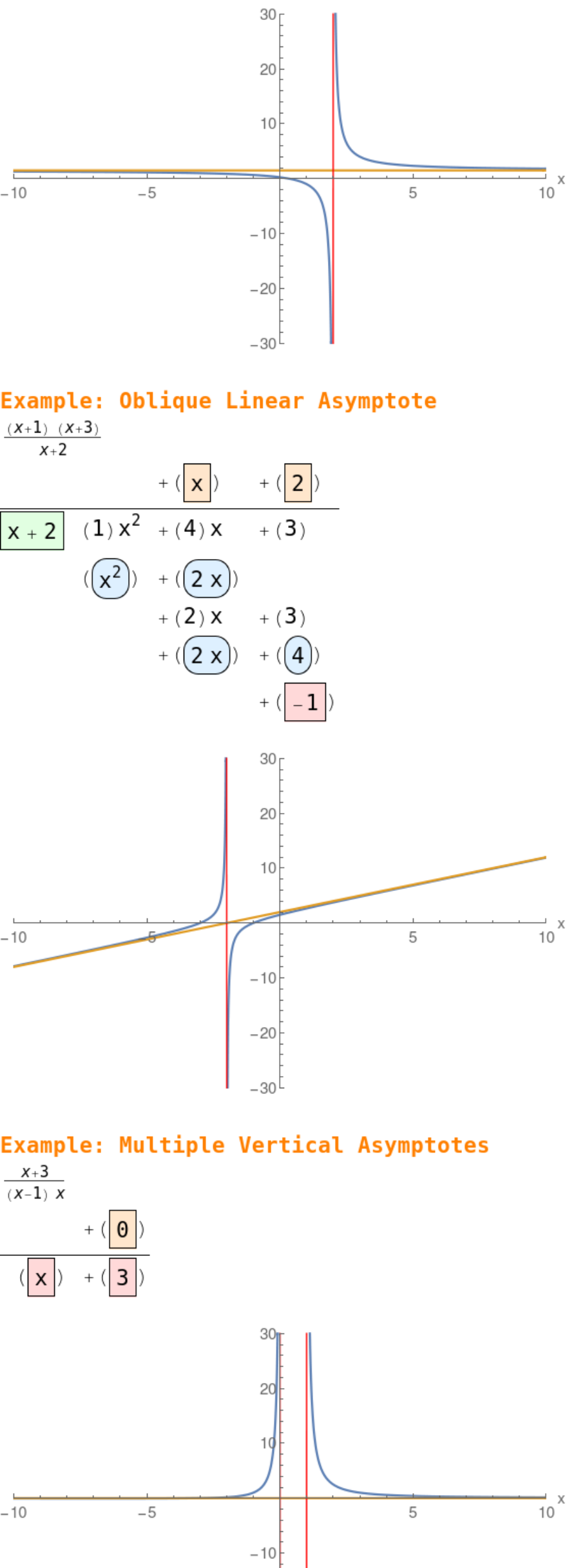
Step 4: Perform a long division to find the quotient which specifies the oblique asymptote.

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

Example: Horizontal Asymptote

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

$$\begin{array}{r|l} & +\left(\frac{3}{2}\right) \\ \hline 2x-4 & (3)\,x \quad +(-1) \\ & (3x) \quad +(-6) \\ & +(5) \end{array}$$



Example: Oblique Linear Asymptote

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

$$\begin{array}{r|l} & +(x) \quad +(2) \\ \hline x+2 & (1)\,x^2 \quad +(4)\,x \quad +(3) \\ & (x^2) \quad +(2x) \\ & +(2)\,x \quad +(3) \\ & +(2x) \quad +(4) \\ & +(-1) \end{array}$$

Example: Multiple Vertical Asymptotes

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

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