# 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.

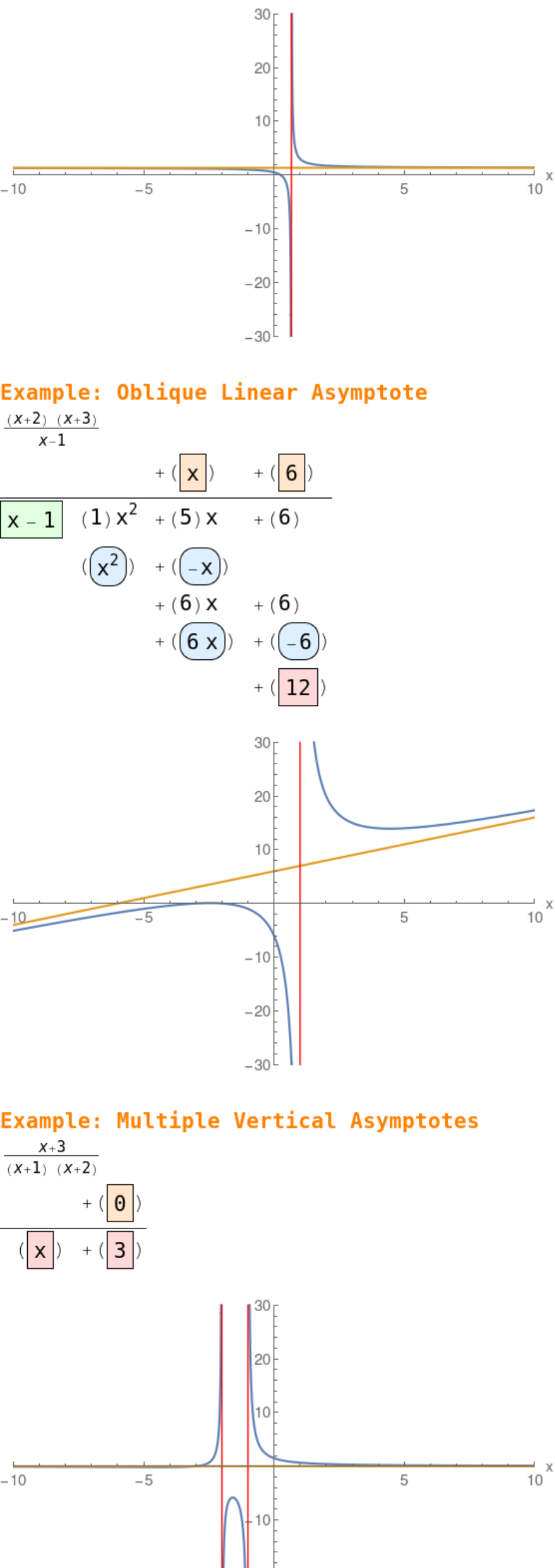
**Step 4:** Perform a long division to find the quotient which specifies the oblique asymptote.

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

## Example: Horizontal Asymptote

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

$$\begin{array}{r|ll} & & +\left(\frac{4}{3}\right) \\ \hline 3x-2 & (4)\,x & +(-1) \\ & \left(4x\right) & +\left(-\frac{8}{3}\right) \\ & & +\left(\frac{5}{3}\right) \end{array}$$




## Example: Oblique Linear Asymptote

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

$$\begin{array}{r|ll} & & +(x) & +(6) \\ \hline x-1 & (1)\,x^2 & +(5)\,x & +(6) \\ & \left(x^2\right) & +(-x) & \\ & & +(6)\,x & +(6) \\ & & +(6x) & +(-6) \\ & & & +(12) \end{array}$$




## Example: Multiple Vertical Asymptotes

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

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