Precalculus Unit 3: 3.1-3.3 Review
Rational Functions, Scatter Plots, and Regression Equations

Complete the following problem.

1. For the function \( f(x) = \frac{x^2 + x - 12}{x^2 - x - 6} \)

   Domain:

   Vertical Asymptote(s):

   Hole:

   Horizontal/Slant Asymptote:

   How did you find the horizontal/slant asymptote?

   x-intercept(s):

   y-intercept:

   Sketch the function on the provided graph. Make sure to accurately plot all of the features of the graph found above.
2. Find the slant asymptote for the function \( f \) given by \( f(x) = \frac{2x^3 + 3x^2 - 8x + 2}{x^2 + 4x - 1} \).

3. An engineer collects the following data showing the speed \( s \) of a Ford Taurus and its average miles per gallon, \( M \).

   a. Draw a scatter plot of the data. Based on the scatter plot, what type of model does it look like you will use?

   b. Using your calculator/computer, find the model that best fits this data.

   c. Use the function found in part b to determine the speed that maximizes miles per gallon. This can be done on the graph on the calculator.

   d. Use the function found in part b to predict miles per gallon for a speed of 63 miles per hour.

   e. Is the work in part d an example of interpolation or extrapolation?