Section #1: The following problems should be done without a graphing calculator.

1. The graph of a 4th degree polynomial function \( f \) is shown to the right. The graph passes through the point \((-1, 64)\). Write a rule for the function \( f \). (You can leave your answer in factored form.)

2. Given \( f(x) = 2x^3 + 3x^2 - 9x \).
   a. Algebraically, find the x-intercepts of the graph of \( f \).
   b. Sketch the graph of \( f \).

3. Simplify the following expressions
   a. \( 36^{-\frac{3}{2}} \)
   b. \( \frac{6e^{-2}}{4e^3} \)
   c. \( \frac{a^3}{a^{\sqrt{a}}} \)

4. Sketch the graph of the following functions. Show asymptotes with dotted lines. What is the y-intercept of each graph?
   a. \( y = \left(\frac{2}{5}\right)^x - 3 \)
   b. \( y = -e^{x-1} \)
   c. \( y = 3 \cdot 2^{-x} + 1 \)

5. Given the graph of \( f \) shown below, sketch the graph of \( f^{-1} \), the inverse of \( f \). (Note: \( f \) has a horizontal asymptote at \( y = -3 \).)

6. If \( f(x) = \frac{2x - 1}{x + 1} \), find \( f^{-1}(x) \), the inverse of \( f(x) \). Then verify your answer by showing that \( f^{-1}(f(x)) = x \).
Section 2: You may use your graphing calculator for the following problems.

7. Look at the worksheet/assignment with the **Box With Top** and **Pizza Box** problems.

8. Solve the equation $4x^3 - 36x = 26x^2 + 21$.
   Hint: You need to use your calculator to find one solution. All solutions should be exact, not decimals.

9. An exponential function in the form $y = a \cdot b^x$ passes through the point $(0, 75)$ and $(8, 14)$. What is the equation of the function? (Round the value of $b$ to 3 decimal places.)

   Given: $A = P \left(1 + \frac{r}{n}\right)^{n-t}$ and $A = Pe^{r \cdot t}$

10. Find the amount that results from each investment.
    a. $2000 invested at 12% compounded monthly for $\frac{3}{2}$ years.
    b. $500 invested at 5.25% compounded continuously for 20 years.

11. Jerome will be buying a used car for $12,000 in 3 years. How much money should he ask his parents for now so that, if he invests it at 5% compounded continuously, he will have enough to buy the car?

12. If Angela has $900 to invest at 10% per year compounded quarterly, how long will it take for her investment to triple? If the compounding is continuous, how long will it be?
   (Note: Write equations to solve these problems, but solve the equations graphically.)

13. At what interest rate (to the nearest 0.01%) compounded monthly must $1000 be invested for 5 years so that the accumulated amount is $1800? (Solve algebraically.)