1. Solve the equation $3x^3 + 7x^2 - 22x - 8 = 0$ given that $\frac{1}{3}$ is a zero of 
$f(x) = 3x^3 + 7x^2 - 22x - 8$.

2. Solve the following inequalities. Give your solution in interval notation.
   a) $\frac{1}{x+1} < \frac{1}{x-4}$
   b) $3x^3 + 7x^2 - 22x - 8 > 0$. (Note: you may use your work from problem 1 on this part.)

3. Suppose you have $25,000 to invest.
   a) Which investment yields the greatest return over three years (i) 7% compounded monthly or (ii) 6.8% compounded continuously?
   b) If you choose option (i) and your $25,000 is compounded monthly at a rate of 7%, how many years (rounded to the nearest tenth) will it take for your investment to be worth $45,000?

4. Solve the following for $x$: $4^{2x} - 4^x - 2 = 0$

5. Consider the function $f(x) = \frac{-x}{x+1}$
   a) What are the vertical and horizontal asymptotes of the graph of $f(x)$?
   b) Does the graph of $f(x)$ have any symmetry? Be sure to show why or why not.

6. Condense the logarithmic expression: $4 \log x - \frac{1}{2} (2 \log(x-1) + \log y)$

7. Divide using long division: $(6x^3 + 13x^2 - 11x - 15) ÷ (3x^2 - x - 3)$

8. Use the rational root theorem to find all zeros of $f(x) = x^3 - 2x^2 - x + 2$

9. Solve for $x$: $2 \ln x = \ln 98 - \ln 2$. Give an exact answer, no decimals.

10. Evaluate without a calculator. Explain why your answer is true:
   a) $\log_3 27$
   b) $\ln e^{17}$
   c) $\log_4 \frac{1}{\sqrt[3]{4}}$