Math 13    Spring 2000
EXAM 1
7 problems, 10 points each

Instructions.
1. “Show enough work to justify your answers.”
2. No calculators, no computers!
3. Do the problems in the given order.
4. Start each problem on a new page.
5. Don’t leave before time is up unless you are sure you’ve solved all the problems.
6. Keep this sheet.

Problems.
1. Determine whether the following function is odd, even or neither. Confirm your answer by computations.

\[ f(t) = \begin{cases} 
10t & \text{if } 0 \leq t \leq 10 \\
100 & \text{if } 10 < t < 20 \\
0 & \text{if } t \geq 20 
\end{cases} \]

Sketch the graph of the function. (b) Now suppose \( f(t) \) represents the speed of a car at time \( t \) sec. Describe what happened.

3. The graph below is the graph of \( f(x) = Ae^x \) for some constant \( A \). Determine the value of \( A \).

4. The pictured graph represents the number of mosquitos in a certain area. What happened to (a)
the mosquito population and (b) its rate of growth? Explain.

5. Is \( f(x) = \cos(\pi x) + 3 \) a periodic function? If it is, find the period. You may graph it to decide, but then justify your conclusion symbolically.

6. (a) Sketch the graph of the function \( f(x) = \frac{1}{x + 1} \) for \( x > -1 \). (b) Sketch the graph of \( f^{-1} \) (give \( x \)-, \( y \)-intercepts, etc.). (c) Find the formula for \( f^{-1} \).

7. Write the function \( h(x) = e^{3x} - 2e^x + 1 \) as a composition of two functions \( f \) and \( g \) where \( f(x) = e^x \) and \( g \) is a polynomial. Give formulas for \( f \) and \( g \). Hint: use the properties of the exponential function.