NOTE: This is a sample to give you an idea of the types of questions that might be on your TEST 1.

There are a total of 6 problems on 4 pages. Please be sure that you have the entire test. Also, show all necessary work; answers that seem to appear by magic will receive no credit.

1. Differentiate the following functions:
   a. \( f(x) = \frac{x^2}{x+2} \)
   b. \( y = \ln\left(3x^2 + e^{5x}\right) \)

2. Use geometry to evaluate the definite integral \( \int_2^6 (2t+1)dt \).

3. Find each of the following antiderivatives:
   a. \( \int \left( \frac{5}{y^2} - 4y^2 \right) dy \)
   b. \( \int (x+3)(x^2 + 6x + 2)^4 \) \( dx \)
   c. \( \int \frac{\sqrt{x^{1/2}} - 3}{\sqrt{x}} \) \( dx \)

4. The following is a graph of \( f(x) = 3x^2 + 2 \) on the interval \([-2, 3]\).
   
   ![Graph of f(x) = 3x^2 + 2](image)
   
   a. For \( n = 5 \), clearly and carefully, draw the right-hand rectangles on the graph.
   b. Find the right-hand sum.
   c. If \( v = f(t) \) is a velocity in feet per second and \( t \) is time in seconds, what does the answer to part b tell us?

5. Use the Fundamental theorem of calculus to evaluate \( \int_{-1}^{1} (2x+1)^3 \) \( dx \).

6. Find the average value of the function \( f(x) = x^2 \) on the interval \([0, 4]\).
7. Find the area enclosed by the curves $x = x, \ y = 1/x, \ x = e$ and $x = e^2$. 