King Fahd University of Petroleum and Minerals
Department of Mathematical Sciences
Math - 132 Major Exam I1
Date: April 21, 2001

Serial #: ____   St. Number: _____   Name: _____   Time: 7:00 – 8:10 pm.

SHOW ALL YOUR WORK. NO CREDITS FOR ANSWERS NOT SUPPORTED BY WORK.

1. (20 points) Consider the function: $f(x) = 3x^5 - 5x^3$.

   a) Find the critical numbers.
   b) Find the increasing and decreasing intervals.
   c) Find the local extrema of $f(x)$.
   d) Find the inflection points if any exists.
   e) Find the concavity intervals.

2. (6 points) Find all vertical and horizontal asymptotes to the graph of the function:
$$y = \frac{2x^2 - 8}{x^2 - x - 6}$$

3. (12 points) Sketch the graph of the function $f(x) = xe^{-x}$. **Clearly indicate all important points on the graph**, such as, extrema, inflection points, and intercepts if any such points exist. Also the concavity must be clear.

4. (10 points) If the price of a calculus book is 20 Reyals, then 1000 copies will be sold. For each 10 Halalas decrease in the price, 10 more copies will be sold. What price will produce the maximum revenue?

5. (10 points) A rectangular field is to be enclosed on all sides with a fence. Fencing material costs $3 per foot for the two sides, and $6 per foot for the other two sides. Find the maximum area that can be enclosed for $2400.

6. (10 points) If $y'' = 2e^x$, find y subject to the initial conditions: $y'(0) = 1$, and $y(1) = 0$.

7. (32 points) Evaluate the following integrals:

   a. $\int \frac{(1-x)^2}{\sqrt{x}} \, dx$

   b. $\int_0^1 \frac{e^{1+\sqrt{x}}}{\sqrt{x}} \, dx$

   c. $\int 2^{-x}(1+3^x) \, dx$

   d. $\int \frac{dx}{1+e^{-x}}$