King Fahd University of Petroleum and Minerals
Department of Mathematics and Statistics
Math 132 – Applied Calculus
Semester – 071

Exam II **Dr. M. Z. Abu-Sbeih** **December 4, 2007**

Ser No: ____ Student No.: _____. Name: _____

Show all your work. No credits for answers without justification.
Write neatly and eligibly. You may loose points for messy work.

Problem 1 (25 points):

1. (Problem 19 pg 676) A TV Cable Company has 4800 subscribers who are each paying \$18 per month. It can get 150 more subscribers for each \$0.5 decrease in the monthly fee. What rate will yield maximum revenue and what will this revenue be?
2. Use differentials to approximate $e^{0.01}$.
3. The marginal revenue of a certain product is $\frac{dR}{dq} = 2000 - 20q - 3q^2$. Find the demand function.

Problem 2 (25 points):

1. Find the area between the graph of $y = x^2 - 1$ and the x- axis from $x = -2$ and $x = 2$.
2. Find the area enclosed by the graphs of $y = (x-1)^2$ and $y = x + 1$.
3. Find $\frac{d}{dx}\int_0^1 \left(e^{x^2} + 5\sqrt{x}\right) dx$

Problem 3 (25 points):

Evaluate the integral:

1. $\int x\left(\sqrt{x} - \frac{1}{x^2} + \frac{1}{x^3}\right) dx$
2. $\int \frac{dx}{x + \sqrt{x}}$
3. $\int 2^{3x} 5^{-2x} dx$
4. $\int \frac{\log_3 x}{x} dx$
5. $\int_0^1 \frac{dx}{1 + e^{-x}}$

Problem 4 (25 points):

Consider the function $f(x) = \frac{x}{(x+1)^2}$. Given that

$$f'(x) = \frac{1-x}{(x+1)^3} \quad \text{and} \quad f''(x) = \frac{2(x-2)}{(x+1)^4}.$$

a. Find all vertical and horizontal asymptotes if any exists.
b. Find the critical numbers if any exists.
c. Find the increasing and decreasing intervals.
d. Find the local and absolute extrema if any exists.
e. Find the concavity intervals.
f. Find the inflection points if any exists.
g. Sketch the graph of the function. Indicate all critical features of on the graph.
h. Find the absolute extrema of the function.