Math 158: Midterm exam II
March 3, 2008

LAST name _____ FIRST name _____

Student ID

Instructions:

- Print your name and student ID number.
- This is a closed book exam.
- **Calculators (of any sort) are NOT allowed.**
- If you have insufficient space, use the back of the page, but INDICATE that the solution is on the back. The back of the page can also be used for rough work.
- You may lose marks if your explanations are incomplete or poorly presented.
- There are 5 questions. Point values are given in parentheses. 48 points maximum.
- Duration 50 minutes.

Question	Score	Maximum
1		8
2		12
3		8
4		8
5		12
Total		48

1. (8 marks) Find the following integral

$$\int 3x\cos(4x)dx.$$

2. (12 marks) This problem contains 2 parts, (a) and (b). Part (b) is on the next page. Find the value of each integral, provided it converges

   (a) $\int_1^\infty \frac{\ln x}{x^2} dx$

(b) $\int_2^\infty \frac{1}{\sqrt{2x+1}} dx$

3. (8 marks) Let the function $f(x) = 150e^{-0.02x}$ represent the rate of continuous money flow in dollars per year. Assume a 10-year period at an interest rate of 8% compounded continuously and find the following:

   (a) the present value of money flow;

   (b) the accumulated amount of money flow at $t = 10$.

4. (8 marks) Find the volume of the solid of revolution obtained by rotating about the x axis the region bounded by the curves: $y = e^x$, $y = \frac{1}{x+1}$, $x = 0$ and $x = 2$. Draw a figure to illustrate your reasoning.

5. (12 marks) This problem contains two parts, (a) and (b). Part (b) is on the next page.

   (a) Find $f_x(x, y)$, $f_y(x, y)$ and $f_{xy}(x, y)$ for

$$f(x, y) = \frac{3x}{x + y^2}$$

(b) Graph $z = -(x^2 + y^2)$. Justify your graph.