

Print Name: \_\_\_\_\_ Student Number: \_\_\_\_\_

Section Time: \_\_\_\_\_

**Math 20C.**  
**Midterm Exam 2**  
**November 21, 2005**

*Read each question carefully, and answer each question completely.*  
*Show all of your work. No credit will be given for unsupported answers.*  
*Write your solutions clearly and legibly. No credit will be given for illegible solutions.*

1. (6 points)

(a) Find the tangent plane approximation  $L(x, y)$  of the function

$$f(x, y) = \sin(3x + 2y) + 2$$

at the point  $(2, -3)$ .

(b) Use the approximation above to estimate the value of  $f(2.2, -2.9)$ .

#	Score
1	
2	
3	
4	
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2. (6 points) Find the absolute maximum and absolute minimum of

$$f(x, y) = 1 + xy - 2y - \frac{1}{4}x^2$$

in the closed triangular region with vertices given by  $(0, 0)$ ,  $(0, 1)$ , and  $(2, 0)$ . Justify your answer.

3. (6 points) Using Lagrange multipliers find the maximum and minimum values of

$$f(x, y) = 2x(y + 1),$$

subject to the constraint

$$x^2 + y^2 = 1.$$

Show all your work.

4. (6 points) Compute the double integral of the function

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

in the domain

$$R = \{(x, y) \in \mathbb{R}^2 : 1 \leq x \leq 2, 0 \leq y \leq 1\}.$$

Show all your work.