

MATH261 EXAM II FALL 2007

NAME: _____

SECTION NUMBER: _____

You may NOT use calculators or any references. Show work to receive full credit.

GOOD LUCK !!!

Problem	Points	Score
1	10	
2	10	
3	10	
4	10	
5	15	
6	15	
7	15	
8	15	
Total	100	

1. Determine the value of the limit or show that it does not exist.

(a) $\lim_{(x,y) \rightarrow (\pi/2,0)} \frac{\cos y + 1}{y - \sin x} =$

(b) $\lim_{(x,y) \rightarrow (0,0)} \frac{x^2}{x^2 + 4y^2} =$

2. Suppose $f(x, y) = \sin(e^x y^2)$.

(a) Find $\partial f / \partial x$ and $\partial f / \partial y$.

(b) Find f_{xx}

3. Use the Chain Rule to find $\frac{\partial z}{\partial u}$ when

$$z = z(w, x, y) = x \ln(3x + y)e^{wx}, \quad w = te^{tu}, \quad x = \cos(tu^2), \quad y = \sin(t^2)$$

4. Find z_y at the coordinate point $(0, 1, 1)$ when z is defined implicitly by the equation

$$f(x, y, z) = x^2 + y^3 + z^4 + xyz^2 = 2$$

5. Given $f(x, y, z) = e^{xy} \ln(x + 2z)$

(a) Find the gradient of f .

(b) Find the Directional Derivative of f at the point $P(1, 0, 1)$ in the direction of the vector $\langle 1, 1, 2 \rangle$.

(c) In what direction is the directional derivative at P greatest?

6. Find an equation of the tangent plane to the level surface defined by the function

$$f(x, y, z) = \sin(2xy^2) + z^2 = 1, \quad \text{at the point } (\pi, 2, -1)$$

7. For the function $f(x, y) = x^2 + y^2 + xy^2$ complete the following

(a) Find the critical points.

(b) Using the second derivative test, classify each point as either a local minimum, maximum or saddle point. The answer should include the function value.

8. Using Lagrange multipliers, find the extreme values of the function $f(x, y) = x + 2y$ on the ellipse $3x^2 + 4y^2 = 3$.