Math 210 Midterm II March 29, 1993

Name _____ SS number _____

CIRCLE YOUR ANSWER
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1) (10pt) A point has spherical coordinates $(1, \frac{\pi}{6}, \frac{\pi}{6})$. What are the cylindric and rectangular coordinates for the point?

2) (10pt) Find the following limit (if it exists):

$$\lim_{(x,y)\to(0,0)} \frac{x^2 y}{x^4 + y^2}.$$

3) (10pt) Let $z = e^{x^2} \sin(x - y)$. Find $\frac{\partial z}{\partial x}$.

4) (10pt) Let $z = xe^y + yx$, $x = st^2$ and $y = t + s$. Find $\frac{\partial z}{\partial t}$.

5) (10pt) Find the equation of the plane tangent to the surface $z = \sqrt{xy - x}$ at the point $(1, 2, 1)$.

6) (10pt) The heat at a point (x, y) in the plane is given by $h(x, y) = x^2 y e^{-x^2-y^2}$. A particle is at the point $(1, 2)$. In what direction is the heat incresasing the most rapidly? What is the rate of increase in that direction?

7) (15pt) Find the local maximums, local minimums and saddle points of

$$f(x, y) = x^2 y - 2x^2 + 2yx - 3y.$$

8) (10pt) Maximize $f(x, y, z) = x + 3y + 5z$ subject to the constraint $x^2 + y^2 + z^2 = 1$.

9) (15pt) Find the absolute maximum and minimum for the function $f(x, y) = x^2 - yx$ on the rectangle with corners (1,2), (1,-3), (-1,-3), (-1,2).