MATH 233 **FALL 2004**

PRACTICE EXAMINATION II

1) Find the rectangular coordinates of the center of the sphere with spherical coordinate equation $\rho = 2\sin(\phi)\sin(\theta)$.

2) Find the area of the region enclosed by one loop of the curve $r = 4\sin(3\theta)$.

3) What types of curves will show up in the contour map for the function $f(x,y) = \frac{y}{x^2+y^2}$.

4) Find $\lim_{(x,y)\to(0,0)} \frac{x^2+y^2}{\sqrt{1+x^2+y^2}-1}$.

5) Let C be the curve resulting from the intersection of the hyperboloid $z^2 = x^2 - y^2$ and the plane $y = 4$. Find the slope of the tangent line to C at the point (5,4,3) .

6)Find an equation for the tangent plane to the elliptic paraboloid $z = 2x^2 + 5y^2$ at the point (2,1,13) .

7) For $f(x,y) = \ln(x^2y + xy^2)$ find $\frac{\partial f}{\partial x}(2,3)$.

8) Given the equation $xy^2 + 3z = \frac{yz^2}{2}$, find $\frac{\partial z}{\partial y}$.

9) Suppose that $z = f(x,y)$ and we are given that $f(1,1) = 15$, $\frac{\partial z}{\partial x}(1,1) = -2$ *and* $\frac{\partial z}{\partial y}(1,1) = 8$. If $\Delta x = -0.15$, $\Delta y = 0.5$ then find an approximation for $f(0.85, 1.5)$.

10) Find the domain of the vector function $\mathbf{r}(u,v) = \ln(u-v)\,\mathbf{i} + \sqrt{u}\,\boldsymbol{j} + \boldsymbol{k}$.

11) Find **parametric representation** for that part of the cone $x^2 = y^2 + z^2$, that lies behind the y-z plane .

12) Find an equation for the tangent plane to the surface $x^2 - 3y^2 + z^2 + 2 = 0$ at the point $(1,1,1)$.

13) The temperature in the x-y plane is given by $(x,y)\sin(x) + xy$. Find the direction from (0,1) at which the temperature increases fastest .

14) $f(x,y) = xy$ .F ind the directional derivative $D_u f(1,1)$ where $\mathbf{u} = \langle \frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2} \rangle$.

15) A box made of steel has a base of 2 ft x 2 ft and a height of 5 ft. Suppose all four sides have metal thickness of 0.02 ft and the top and bottom each have thicknesss of 0.04 ft. Estimate the amount of steel, in ft^3, used to construct that box.

16) Supose $z = f(x,y)$, $x = 2u + v$ and $y = 3u - 2v$. Given that $\frac{\partial z}{\partial x} = 3$ and $\frac{\partial z}{\partial y} = -2$ at the point $x = 3, y = 1$, Find $\frac{\partial z}{\partial u}$ & $\frac{\partial z}{\partial v}$.

17) If $f(x,y,z) = yz + \sin(xz) + e^{xy}$ then find $\nabla f(0,7,3)$.

18) Find an equation for the tangent plane to the parametric surface $\mathbf{r}(u,v) = (1+2u)\,\mathbf{i} + (-u+3v)\,\mathbf{j} + (u+v)\,\mathbf{k}$ at the point $(3,2,2)$.

19) If $f(x,y) = e^{xyz}$ the find f_{yzy}.

20) If $z = f(x,y) = x^2 + 3xy - y^2$, $\Delta x = 0.04$ and $\Delta y = -0.02$ then find both Δz and dz.