

MATH 261 EXAM 2, Fall 2003

Simplify all answers. Show your work!		Name:	Score	
1.	Let $f(x, y, z) = \ln(25 - x^2 - y^2 - z^2)$ . a) Find $f(2, -2, 4)$ .      Ans:_____	b) Find the domain of $f$ .      Ans:_____	1	
			2	
			3	
			4	
			5	
			6	
			7	
2.	Let $w = f(x, y, z) = x^2 - 3y^2 + z^2$ . Describe the level surfaces for: a) $w > 0$ .      Ans:_____	b) $w = 0$ .      Ans:_____	8	
			9	
			10	
			Tot	
3.	Show that $\lim_{(x,y) \rightarrow (0,0)} \frac{3xy^2}{x^2 + 2y^4}$ does not exist.			
4.	Let $f(u, v) = v \ln(u^2 + v^2)$ . a) $f_u$ .      Ans:_____	b) $f_v$ .      Ans:_____		
5.	Let $u = \sin x \cosh y + \cos x \sinh y$ a) Find $u_{xx}$ .      Ans:_____	b) Show that $u$ is harmonic.      Ans:_____		
Extra space				

Part II.	Name:	
6.	Let $x - z = \tan^{-1}(yz)$ . Compute: a) $dz$ .          Ans:_____	b) $z_x$ and $z_y$ .          Ans:_____
7.	Let $w = xe^{y-z^2}$ , $x = 2uv$ , $y = u - v$ , and $z = u + v$ . Use the chain rule to compute: a) $w_u$ at $(3, -1)$ .          Ans:_____          b) $w_v$ at $(3, -1)$ .          Ans:_____	
8.	Given the be the surface $\mathcal{S} : z = y \ln x$ and the point $P(1, 4, 0)$ , find: a) A normal to $\mathcal{S}$ at $P$ .          Ans:_____	b) The equation of the tangent plane at $P$ .          Ans:_____
9.	Let $f(x, y, z) = x^3y^4z^2$ , $P(1, -1, 1)$ and $\vec{v} = \langle 2, -2, 1 \rangle$ . Find: a) The rate of change of $f$ at $P$ in the direction $\vec{v}$          Ans:_____	b) The maximum rate of increase at $P$          Ans:_____
10	Let $f(x, y) = x^4 - 4xy + y^4 + 4$ a) Find the critical points.          Ans:_____	b) Classify the critical points.          Ans:_____