

MATH 261 Sample Exam 2

Simplify all answers. Show your work!		Name:		Score	
1.	Let $f(x, y, z) = \sqrt{x^2 - 3y^2 + 5z^2}$. a) Find $f(1, -1, 1)$. Ans:_____	b) Describe the level surfaces for $k = 0, 1$. $k = 0$:_____ $k = 1$:_____	1		
			2		
			3		
			4		
			5		
			6		
			7		
2.	Let $R(p, q) = \tan^{-1}(pq^2)$. Compute the first partial derivatives: a) R_p . Ans:_____	b) R_q . Ans:_____	8		
			9		
			10		
			Tot		
3.	Show that $\lim_{(x,y) \rightarrow (0,0)} \frac{5x^2y}{3x^4 + y^2}$ does not exist. (Use proper syntax.) 				
4.	Let $u = \sin(kx) \sin(akt)$, with a and k constant. a) Find u_{xx} . Ans:_____	b) Show that u satisfies the wave equation. 			
5.	Let $x^4 + y^4 + z^4 + 4xz = 1$. Compute: a) dz . Ans:_____	b) $\frac{\partial z}{\partial x}$. Ans:_____			
Extra space					

Part II.		Name:	
6.	Let $z = x^3y^2$, $x = r \cos \theta$, and $y = r \sin \theta$. <u>Use the chain rule</u> to compute: a) z_r at $(1, \pi/3)$. Ans:_____. b) z_θ at $(1, \pi/3)$. Ans:_____.		
7.	Given the be the surface $\mathcal{S} : f(x, y) = 4 - 3x^2 + 2y^2$ and the point $P(1, 1, 3)$, find: a) A normal to $\mathcal{S}$ at P. Ans:_____. b) The equation of the tangent plane at P. Ans:_____.		
8.	Let $f(x, y, z) = x^2 + 4y^2 + 9z^2$ and $P(2, 1, -1)$. Find: a) The slope of f at P in the direction $\mathbf{v} = 2\mathbf{i} - 2\mathbf{j} - \mathbf{k}$ Ans:_____. b) The maximum rate of increase at P Ans:_____.		
9	Let $f(x, y) = 4xy - x^4 - y^4 + 12$. a) Find the critical points. Ans:_____. b) Classify the critical points. Ans:_____.		
10	Use Lagrange multipliers to find the extrema of $f(x, y) = 2x^2 + y^2$ with $x^2 + y^2 = 1$. Ans:_____.		
Comments on this test			