

MATH 261 EXAM 2, Spring 2021

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