

MATH 261 Final Exam, Fall 2007

Simplify answers. No work, no credit		Name:	Score			
1.	Let $\mathbf{v} = 3\mathbf{i} + 2\mathbf{j} - 1\mathbf{k}$ and $\mathbf{w} = 4\mathbf{i} + 2\mathbf{j} + \mathbf{k}$. Find: a) $\mathbf{v} \cdot \mathbf{w}$ Ans:_____	b) the angle formed by \mathbf{v} and \mathbf{w} Ans:_____	1	11		
			2	12		
			3	13		
			4	14		
			5	15		
			6	16		
			7	17		
			8	18		
2.	Let $\mathbf{v} = 2\mathbf{i} + 3\mathbf{j} + 6\mathbf{k}$ and let P be the point $P(5, 0, -3)$. Find a) A unit vector in the direction of \mathbf{v} Ans:_____	b) The line through P parallel to \mathbf{v} Ans:_____	9	19		
			10	20		
			Tot			
3.	Let \mathcal{L} : be the line of intersection of the planes $6x - 2y + z = 0$ and $x - 5z = 1$. Find: a) A direction vector for \mathcal{L} . Ans:_____	b) The equation of the line. Ans:_____				
4.	Identify the names of the graphs described by the following equations. a) $\mathbf{r}(t) = \langle 3 + t, t, 4 - 2t \rangle$ Ans:_____	b) $x^2 + 4y^2 + z^2 = 9$ Ans:_____				
			c) $x = \cosh t, y = \sinh t$ Ans:_____	d) $z^2 = 4x^2 + 4y^2$ Ans:_____		
			e) $\mathbf{r}(t) = \langle 2t, 5, 4 - t^2 \rangle$ Ans:_____	f) $z^2 = x^2 + y$ Ans:_____		
5.	A particle moves along the path $\mathbf{r}(t) = t^3\mathbf{i} + 4t\mathbf{j} + (t + 2)\mathbf{k}$. Find the a) Velocity at $t = 2$. Ans:_____	b) Speed at $t = 2$ Ans:_____				
Extra Space						

		Name:
6.	A cyclist moves in a circular path given by $\mathbf{r}(t) = 3 \cos 2t \mathbf{i} + 3 \sin 2t \mathbf{j} + 0\mathbf{k}$. Use any method to find: a) \mathbf{T} at $t = \pi/4$	b) \mathbf{N} at $t = \pi/4$
	Ans: _____.	Ans: _____.
7.	Variables P, V and T satisfy the equation $PV = nRT$, where $R, n = \text{const}$. Find a) the differential dV	b) $\partial V / \partial P$
	Ans: _____.	Ans: _____.
8.	Suppose $df = (3x^2y - y^2 + y)dx + (x^3 + x - 2xy - 1)dy$. Find a) $f(x, y)$	b) $f_{xx} + f_{yy}$
	Ans: _____.	Ans: _____.
9.	Let $z = x^2 + y^2$. Find a) A normal to the surface at $(1,1,2)$.	b) The equation of the tangent plane at $(1,1,2)$.
	Ans: _____.	Ans: _____.
10.	Let $f(x, y, z) = x^2 - 2yz$, $\mathbf{u} = \langle 2/3, 2/3, 1/3 \rangle$. Find: a) $D_{\mathbf{u}}f(1, 1, 2)$.	b) The maximum rate of change of f at $(1, 2, 2)$.
	Ans: _____.	Ans: _____.
	Extra space	

		Name:
11.	<p>Let \mathcal{S} be the surface $f(x, y) = x^3 + y^3 - 3xy$.</p> <p>a) Find the two critical points.</p>	<p>b) Classify the two critical points .</p>
	Ans: _____.	Ans: _____.
12.	<p>Evaluate:</p> <p>a) $\int_0^1 \int_0^z \int_0^x 6xz \, dy \, dx \, dz$</p>	<p>b) $dA = dx \wedge dy$, if $x = u^2 - v^2$ and $y = 2uv$</p>
	Ans: _____.	Ans: _____.
13.	<p>Let S be the surface area of the plane $2x + 3y + 2z = 6$ in the first octant.</p> <p>a) Compute S using vectors.</p>	<p>b) Set up the surface integral.</p>
	Ans: _____.	Ans: _____.
14.	<p>Find the volume cut out of the sphere $x^2 + y^2 + z^2 = 25$ by the cylinder $x^2 + y^2 = 9$</p>	
		Ans: _____.
15.	<p>In the given integrals, perform the indicated changes and thus compute:</p> <p>a) $\int_0^1 \int_{\sqrt{y}}^1 e^{x^3} \, dx \, dy$. (Reverse the order)</p>	<p>b) $\int_{-2}^2 \int_0^{\sqrt{4-x^2}} \sqrt{x^2 + y^2} \, dy \, dx$ (Switch to polar)</p>
	Ans: _____.	Ans: _____.

		Name:
16.	<p>Let $\mathbf{F} = (y - z^2)\mathbf{i} + (z - x^2)\mathbf{j} + (x - y^2)\mathbf{k}$. Compute</p> <p>a) $\nabla \times \mathbf{F}$</p>	<p>b) $\nabla \cdot \mathbf{F}$</p>
	Ans:_____.	Ans:_____.
17.	<p>Find $W = \oint_C (e^x - y^3) dx + (x^3 - \cos y) dy$, where C is the circle $x^2 + y^2 = 1$</p>	
		Ans:_____.
18.	<p>Let $\mathbf{F} = yz\mathbf{i} + (xz - 2y)\mathbf{j} + xy\mathbf{k}$ and C be the curve $\mathbf{r} = 3t\mathbf{i} + 4t^2\mathbf{j} + t^3\mathbf{k}$, $t \in [0, 1]$. Compute $\int_C \mathbf{F} \cdot d\mathbf{r}$.</p>	
		Ans:_____.
19.	<p>Compute: $\int \int_S (\nabla \times \mathbf{F}) \cdot d\mathbf{S}$, where $\mathbf{F} = 2y\mathbf{i} - 5x\mathbf{j} + 3z\mathbf{k}$, and $S: z = 9 - x^2 - y^2, z \geq 0$.</p>	
		Ans:_____.
20.	<p>Compute: $\int \int_S \mathbf{F} \cdot d\mathbf{S}$, where $\mathbf{F} = yz\mathbf{i} + xz^2\mathbf{j} + 3z\mathbf{k}$, and $S: x^2 + y^2 + z^2 = 1$</p>	
		Ans:_____.