

MATH 261 Final Exam, Fall 2001

Simplify answers. No work, no credit		Name:	Score	
1.	A force $\mathbf{F} = 2\mathbf{i} - 4\mathbf{j} + 5\mathbf{k}$ causes a displacement $\mathbf{r} = 4\mathbf{i} - 2\mathbf{j} + 3\mathbf{k}$. Find: a) The component of \mathbf{F} in the direction of \mathbf{r}	b) The work done by the force	1	11
			2	12
			3	13
			4	14
			5	15
			6	16
			7	17
			8	18
Ans:_____			Ans:_____	
2.	A line passes through the point $P(1, -2, 3)$ and is \perp to the plane $2x + 2y + z = 7$ Find: a) The direction vector of the line.	b) The equation of the line.	9	19
			10	20
			Tot	
Ans:_____			Ans:_____	
3.	A plane \mathcal{P} passes through the points $P(1, -1, 1)$, $Q(1, 2, -4)$ and $R(5, 0, 1)$. Find: a) A normal to \mathcal{P} .	b) The equation of \mathcal{P} .		
			Ans:_____	
4.	A particle moves along the curve $\mathbf{r}(t) = -3\mathbf{i} + (5 \cos 3t - 2)\mathbf{j} + (5 \sin 3t - 5)\mathbf{k}$. Find: a) The speed v	b) The curvature κ		
			Ans:_____	
5.	The point $P(4, \pi/3, \pi/4)$ is given in spherical coordinates. Find its: a) Rectangular coordinates.	b) Cylindrical coordinates.		
			Ans:_____	
Extra Space				

		Name:
12.	<p>Let S be the surface $f(x, y) = 4 + x^3 + y^3 - 3xy$.</p> <p>a) Locate the two critical points.</p> <p style="text-align: right;">Ans: _____.</p>	<p>b) Classify the critical points.</p> <p style="text-align: right;">Ans: _____.</p>
13.	<p>Evaluate the given integrals:</p> <p>a) $\int \int_R (4 - 2y) dA$; $R = [0, 1] \times [0, 2]$</p> <p style="text-align: right;">Ans: _____.</p>	<p>b) $\int \int_R e^{x^2+y^2} dA$; $R: x^2 + y^2 = 4$.</p> <p style="text-align: right;">Ans: _____.</p>
14.	<p>Compute coordinates of the center of mass of the semicircle $y = \sqrt{9 - x^2}$ with density $\rho(x, y) = 5$</p> <p>a) $x_{c.m} =$</p> <p style="text-align: right;">Ans: _____.</p>	<p>b) $y_{c.m} =$</p> <p style="text-align: right;">Ans: _____.</p>
15.	<p>Compute the volume inside the the semisphere $z = \sqrt{25 - x^2 - y^2}$ and the cylinder $x^2 + y^2 = 4$.</p> <p style="text-align: right;">Ans: _____.</p>	
16.	<p>Let $x = u \sin v$ and $y = u \cos v$</p> <p>a) Compute $dx \wedge dy$.</p> <p style="text-align: right;">Ans: _____.</p>	<p>b) The Jacobian of the transformation.</p> <p style="text-align: right;">Ans: _____.</p>

		Name:
17.	<p>Let $\mathbf{F} = 2xy^2z^3\mathbf{i} + (2x^2yz^3)\mathbf{j} + 3x^2y^2z^2\mathbf{k}$</p> <p>a) Show that \mathbf{F} is conservative.</p> <p style="text-align: right;">Ans:_____.</p>	<p>b) Find f such that $\mathbf{F} = \nabla f$</p> <p style="text-align: right;">Ans:_____.</p>
18.	<p>Find the surface area of $z = 16 - x^2 - y^2$; $z \geq 0$.</p> <p style="text-align: right;">Ans:_____.</p>	
19.	<p>Compute $\oint_C \mathbf{F} \cdot d\mathbf{r}$, where $\mathbf{F} = y^3\mathbf{i} - x^3\mathbf{j}$, and C is the circle $x^2 + y^2 = 16$.</p> <p style="text-align: right;">Ans:_____.</p>	
20.	<p>Compute: $\int \int_S \mathbf{F} \cdot d\mathbf{S}$, where $\mathbf{F} = x\mathbf{i} + 2y\mathbf{j} + 3z\mathbf{k}$, and $S : x^2 + y^2 + z^2 = 9$.</p> <p style="text-align: right;">Ans:_____.</p>	
	<p>Extra Space. (Comments?)</p>	