Ma 227	Exam III A	12/6/11
Name:		
Lecture Section:	Recitation Section:	
I pledge my honor that I have abided b	ry the Stevens Honor System.	
	cell phone, or computer while taking this examedit will not be given for work not reasonably pledge.	
Score on Problem #1a	<u> </u>	
#1b		
#2a	_	
#2b	<u> </u>	
#3a		
#3b		
#4a	_	

#4b _____

Total Score

1a [15 pts.] Evaluate the line integral

$$\int_C \vec{F} \cdot d\vec{r}$$

where $\vec{F}(x,y,z) = y\vec{i} + x\vec{j} + z^2\vec{k}$ and C is the curve given by $\vec{r}(t) = \cos t\vec{i} + \sin t\vec{j} + t\vec{k}$, $0 \le t \le 2\pi$.

1b [15 pts.] Let g(x, y, z) be a scalar function whose cross partial derivatives are continuous. Calculate $\nabla \times \nabla g$.

2 a [14 **pts**.] Find a function
$$\phi(x, y, z)$$
 such that
$$\nabla \phi = \vec{F}(x, y, z) = 2xy^3 z^4 \vec{i} + \left(3x^2 y^2 z^4 + y\right) \vec{j} + \left(4x^2 y^3 z^3 + 2z\right) \vec{k}$$

2 b [6 **pts**.] Let Γ be any closed curve in three space. What is the value of $\oint_{\Gamma} \vec{F} \cdot d\vec{r}$ where \vec{F} is the vector function in 2a. Justify your conclusion.

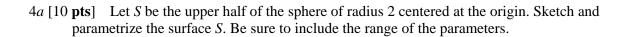
$$\oint_C xydx + x^2y^3dy$$

directly without using Green's Theorem, where C is the triangle with vertices (0,0),(1,0),(1,2).

3b [10 **pts**.] Evaluate the line integral in 3a, namely

$$\oint_C xydx + x^2y^3dy$$

using Green's Theorem.



4b [15 **pts**.] Give an iterated double integral equal to $\iint_{S} z dS$

where S is the surface in part 4a. Do *not* evaluate your expression.

Table of Integrals

$$\int \sin^2 x dx = -\frac{1}{2} \cos x \sin x + \frac{1}{2} x + C$$

$$\int \cos^2 x dx = \frac{1}{2} \cos x \sin x + \frac{1}{2} x + C$$

$$\int \sin^3 x dx = -\frac{1}{3} \sin^2 x \cos x - \frac{2}{3} \cos x + C$$

$$\int \cos^3 x dx = \frac{1}{3} \cos^2 x \sin x + \frac{2}{3} \sin x + C$$

$$\int te^t dt = e^t (t - 1) + C$$

$$\int t^2 e^t dt = e^t (t^2 - 2t + 2) + C$$