STAPLE YOUR WORK

QUIZ 10 MATH 251

LAST NAME_____ FIRST NAME_____

On my honor, as an Aggie, I certify that the solution submitted by me on 26th of April 2011 is my own work. I had neither given nor received unauthorized aid on this work.

Signature: _____

Due TUESDAY 4/26/2011 at the beginning of class.

- *If turned in later than 10 minutes into class, 5 points off.* No papers will be accepted after class.
- If you turn it in to my office (Milner 324), place it in my mailbox (Milner 130) or e-mail a PDF-version to me, make sure you do it before 2:00 p.m., Tuesday 4/26/2011.
- You MUST show ALL your work to get full credit. Just writing the answers down is not enough.

BOX YOUR FINAL ANSWERS.

1. Given the line integral $I = \int_C 4x^2 y \, \mathrm{d}x - (2 + x) \, \mathrm{d}y$ where C consists of the line segment from $(0, 0)$ to $(2, -2)$, the line segment from $(2, -2)$ to $(2, 4)$, and the part of the parabola $y = x^2$ from $(2, 4)$ to $(0, 0)$. Use Green's theorem to **evaluate** the given integral and **sketch** the curve C indicating the *positive direction.*

2. Given the surface $S : x = v^3 - 5u, y = u^2, z = v^2 - 3$.

   (a) Find the normal vector to S at the point corresponding to $(u, v) = (1, 2)$.

   (b) Write the equation of the tangent plane to S passing through the point corresponding to $(u, v) = (1, 2)$. Simplify it.

3. Let S be a unit hemisphere of radius 1. Use surface integral to find the surface area of S.

   Hint: Use spherical coordinates to parametrize the surface. Also find D, the parameter domain.

4. Evaluate the surface integral $\iint_S (y+2)\,\mathrm{d}S$ where S is the portion of the cylinder $x^2+z^2=1$ between the planes $y=-2$ and $y=z+3$ (note that S does not include the ends of the cylinder.)

   Hint: The surface of the cylinder may be parameterized by cylindrical coordinates: $x=r\cos\theta, y=y, z=r\sin\theta$. What is r here? Note that $-2\le y\le z+3$.