SM221S-6021 EXAM FOUR
Thursday, April 19, 2007 Name_____

Please answer the following eight questions in the space provided. Additional paper is available should you need it. Show the details of your work and indicate your answers clearly. I am more interested in the process you use to discover a solution than I am in the solution itself. When you rely on your calculator for a computation, please make it clear what you asked your calculator to do. Each question is worth 12 points.

The first four problems involve the curve C. C is the straight line from the point (-1, 3, 2) to the point (1, -2, -2).

1. Write down a parameterization for C. Remember that a parameterization includes limits on the range of your parameter.

2. Compute $\int_C x + 2y \, ds$.

One of the following two vector fields is conservative. For that vector field, find a potential function and use it to evaluate the line integral. For the other vector field, compute the line integral directly. Make sure I know which computation you're doing which way.

3. Compute $\int_C \langle y, x+z, z \rangle \cdot d\mathbf{r}$

4. Compute $\int_C \langle y, x+y, z \rangle \cdot d\mathbf{r}$

The next four problems involve the surface S, the portion of the cylinder $x^2 + y^2 = 9$ lying above the plane z = 1, and below the plane z = 4, oriented outwards (away from the z-axis.)

5. Find a parameterization for S. Remember that a parameterization includes limits on the ranges of your parameters.

6. Compute (a) $\vec{r}_u$ (b) $\vec{r}_v$ (c) $\vec{r}_u \times \vec{r}_v$ (d) $\left|\vec{r}_u \times \vec{r}_v\right|$ (replace u and v by whatever parameters you used, of course.)

7. Compute $\int_S z\, dS$.

8. Compute $\int_S \mathbf{F} \cdot d\mathbf{S}$ where $\mathbf{F}$ is the vector field $\langle x, z, y \rangle$.