FALL 2008 — MA 227-DW — TEST 4, 2007

Name: ______________________________

1. Part I

There are 6 problems in Part 1, each worth 4 points. Place your answer on the line to the right of the question. Only your answer on the answer line will be graded.

(1) Compute div $\mathbf{F}$ when $\mathbf{F}(x, y, z) = \langle \cos(xz), e^{yz}, x + y \rangle$.

____

(2) Find the curl of the vector field $\mathbf{F}(x, y, z) = \langle 3xz, 0, -5x^2 \rangle$.

____

(3) Compute ∇f when $f = x^2 + y + z$.

____

(4) Find a parametrization for the cylinder $x^2 + y^2 = 1$.

____

(5) Find a function f such that $\nabla f = \langle 2xy + 1, x^2 \rangle$.

____

(6) Evaluate the surface integral $\iint_S 2dS$ when S is a disc with radius 1.

____

2. Part II

There are 3 problems in Part 2, each worth 12 points. On Part 2 problems partial credit is awarded where appropriate. Your solution must include enough detail to justify any conclusions you reach in answering the question.

(1) Let C be the circle with radius 1 centered at the origin and oriented counterclockwise. Evaluate

$$\int_C y dx + x dy$$

by two methods: directly as a line integral and using Green's Theorem.

(2) Find the flux of the vector field $F = \langle x, y, 0 \rangle$ through the surface S, which is given by the parametrization $x = u, y = v, z = 1 - u^2 - v^2$, with $u^2 + v^2 \leq 1$. This means you have to evaluate the integral $\iint_S F \cdot d\mathbf{S}$.

(3) Find the surface area of that part of the cone $z = 1 - \sqrt{x^2 + y^2}$ that lies above the x-y-plane.