

## Math 206 Test Two

Name: \_\_\_\_\_

1. (5 marks) Suppose  $f(x, y) = x - 2y$ .

- a. Evaluate  $\|\vec{\nabla} f(0, 0)\|$ . Show your work.
- b. Evaluate  $D_{(1, -2)} f(0, 0)$ . Show your work.

2. (5 marks) Suppose  $f(x, y, z) = x^2 + y^2 - 2z^2$ .

- a. Evaluate  $\operatorname{div}(\vec{\nabla} f)$ . Show your work.
- b. Evaluate  $\operatorname{curl}(\vec{\nabla} f)$ . Show your work.

3. (5 marks) Suppose  $\vec{f}(t) = (\cos t, \sin t)$  for  $0 < t \leq 2\pi$  is a parametrization of the curve  $C$ .

- a. Find the length of  $C$ . Show your work.
- b. Evaluate the path integral of  $u(x, y) = y$  over  $C$ . Show your work.
- c. Evaluate the path integral of  $\vec{v}(x, y) = (1, 1)$  over  $C$ . Show your work.

4. (5 marks) Suppose  $D$  is the parallelogram in the plane spanned by the vectors  $(1, 1)$  and  $(1, 0)$ .

- a. Evaluate the double integral  $\iint_D xy dA$ . Show your work.
- b. Find a parametrization for the parallelogram in  $R^3$ . Show your work.
- c. Evaluate the surface integral  $\iint_D xy d\sigma$ . Show your work.

5. (5 marks) Change the order of integration in the following triple integral to represent the integral in terms of the other two types of solids ( $x$ -simple and  $y$ -simple.)

$$\int_0^2 \int_0^{4-2x} \int_0^{8-4x-2y} f(x, y, z) dz dy dx.$$

Show your work.