

Math 53, Spring 2000, sections 107 & 109
Quiz #12, 28 April

Name_____

Instructions: You have 20 minutes in which to answer the following two questions. No calculators, notes, or other references may be used.

1. (5 points) True / False:

(Assume that all functions and vector fields are defined everywhere and have continuous partial derivatives)

____ The divergence of the gradient of a function is zero.

____ The curl of the gradient of a function is zero.

____ The divergence of the curl of a vector field is zero.

____ The gradient of the divergence of a vector field is zero.

____ If C is a simple closed curve in the plane and P and Q are functions of x and y , then

$$\oint_C (P_x - Q_x) dx + (P_y - Q_y) dy = 0.$$

2. (5 points) Let S represent the portion of the sphere of radius a parametrized by $x = a \sin \phi \cos \theta$, $y = a \sin \phi \sin \theta$, and $z = a \cos \phi$, where instead of covering the entire sphere, the parameters cover the ranges $0 \leq \phi \leq \frac{\pi}{3}$ and $0 \leq \theta \leq \frac{\pi}{2}$. Find the surface area of S .