Name_____

Date_____

Vector Calculus Independent Study

Unit 7 Sample Test

1. [25 points] Find the surface area of the portion of the cylinder

$$y^2 + z^2 = 9$$

that is above the rectangle $0 \leq x \leq 2$, $-3 \leq y \leq 3$.

2. [25 points] Evaluate the surface integral

$$\iint_S x^2 z + y^2 z \, dS,$$

where S is the portion of the sphere $x^2 + y^2 + z^2 = 9$ above the plane $z = 2$.

3. [25 points] Find the flux of the vector field

$$\vec{F}(x, y, z) = (x, y, 2z)$$

through the surface described by $z = 1 - x^2 - y^2$, $z \geq 0$.

4. [25 points] A certain surface is described parametrically by

$$\vec{S}(u, v) = (u \cos v, u \sin v, u^2).$$

Convert this to an implicit description (one just mentioning x, y, and z), and also find a normal to the surface at $u = \sqrt{2}, v = \pi/4$.