"Quiz" 8

MATH 2400

August 1 - August 6, 2012

1. Let $\vec{F} = \langle y, -x, 10(x^2+y^2)z \rangle$, and σ be the surface $z = 2\sqrt{x^2+y^2}$ for $0 \leq z \leq 9$, with outward orientation. Find the flux of $\vec{F}$ through σ by

   (a) parameterizing the surface using cylindrical coordinates.

   (b) using the function parametrization (or projection).

2. Find the flux of $\vec{F} = \langle z - x - y,\ x - y - z,\ y - x - z \rangle$ through σ, which is the portion of $x^2 + y^2 + z^2 = R^2$ with $y \leq 0$, oriented in the negative y direction.

3. Let σ be the boundary of the solid bounded by the surfaces $x^2 + y^2 = 4$, $z = x + 4$, $z = -y - 4$, oriented outward, and $\vec{F} = \langle -yz^2,\, xz^2,\, z \rangle$.

   (a) Using surface integrals, explicitly compute the flux of $\vec{F}$ through σ.

   (b) Use the Divergence theorem to compute the flux of $\vec{F}$ through σ.

4. Find the surface area of the portion of $x^2 + y^2 + z^2 = R^2$ above $z = a$, for any $0 \leq a \leq R$.