

"QUIZ" for Lecture 22

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E-MAIL SCANNED .pdf OF COMPLETED QUIZ to DrZcalc3@gmail.com (Attachment: q22FirstLast.pdf) ASAP BUT NO LATER THAN Nov. 16, 8:00pm

Evaluate the surface integral  $\int_S \mathbf{F} \cdot d\mathbf{S}$  for the given vector field  $\mathbf{F}$  and oriented surface  $S$ .

$$\mathbf{F}(x, y, z) = \langle xy, yz, zx \rangle,$$

and  $S$  is the part of the paraboloid  $z = 1 - x^2 - y^2$  that lies above the square  $0 \leq x \leq 1, 0 \leq y \leq 1$  and has upward orientation.

$$g = 1 - x^2 - y^2$$

$$P = xy \quad Q = yz \quad R = zx$$

$$\iint_D -xy(-2x) - yz(-2y) \, dA = \iint_D 2x^2y + 2y^2z \, dA$$

$$= \iint_D 2x^2y + 2y^2(1 - x^2 - y^2) \, dA = \iint_D 2x^2y + 2y^2 - 2x^2y^2 - 2y^4 \, dA = \iint_D 2y^2 - 2y^4 \, dA$$

$$\{(x, y) \mid 0 \leq x \leq 1, 0 \leq y \leq 1\} \quad \int_0^1 \int_0^1 2y^2 - 2y^4 \, dA = \frac{2}{3}y^3 - \frac{2}{5}y^5 \Big|_0^1 = \frac{2}{3} - \frac{2}{5} = \frac{4}{15}$$

$$\int_0^1 \frac{4}{15} \, dx = \frac{4}{15}x \Big|_0^1 = \frac{4}{15}$$