

"QUIZ" for Lecture 22

NAME: (print!) Orion Kress-Santilippo Section: 22

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 $\int \int_S \mathbf{F} \cdot d\mathbf{S}$ 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.

$$P = xy \quad Q = yz \quad R = zx \quad \iint_D \left(-P \frac{\partial z}{\partial x} - Q \frac{\partial z}{\partial y} + R \right) dA$$

$$= \iint_D \left(-xy(-2x) - (yz)(-2y) + zx \right) dA$$

$$= \iint_D \left(+2x^2y + 2y^2z + xz \right) dA = \iint_D \left(2x^2y + (1-x^2-y^2)(2y^2+x) \right) dA$$

$$= \int_0^1 \int_0^1 \left(2x^2y + (1-x^2-y^2)(2y^2+x) \right) dx dy$$

USING MAPLE

$$= \frac{83}{180}$$