

q22 Rahul Paleja

Section 22

① Evaluate surface integral $\iint_S F \cdot ds$

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

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

$$g = 1 - x^2 - y^2 \quad P = xy \quad Q = yz \quad R = zx$$

$$\iint_D -xy(-2x) - yz(-2y) + xz \, dA$$

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

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

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

$$\int_0^1 \int_0^1 2x^2y + (1 - x^2 - y^2)(2y^2 + x) \, dx \, dy$$

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