

Section 16.7: Additional Problems

1. A surface is to be oriented in the direction of the positive x -axis. Your friend parameterized the surface and has provided the following cross product. Determine if this cross product could be correct.

(a) cross product: $\langle 1, -a, b^2 \rangle$

(b) cross product: $\langle 2a, 1, b + a \rangle$

2. Evaluate the given surface integral where S is the surface with the parametric equations $x = ab$, $y = a + b$, and $z = a - b$ where $a^2 + b^2 \leq 1$.

$$\iint_S yz \, dS$$

3. Let S be the part of the paraboloid $x = y^2 + z^2$ that lies inside the region given by $0 \leq y \leq 1$, $0 \leq z \leq 1$ with orientation in the positive x direction.

Let $\mathbf{F} = \langle e^z, ze^y, y^2z \rangle$. Find the flux of \mathbf{F} across S . i.e. compute $\iint_S \mathbf{F} \cdot d\mathbf{S}$

4. Let S be the closed surface of a tetrahedron with vertices $(0, 0, 0)$, $(3, 0, 0)$, $(0, 2, 0)$, and $(0, 0, 6)$ Let $\mathbf{F} = \langle y, z - y, x \rangle$ and use positive orientation.

Evaluate $\iint_S \mathbf{F} \cdot d\mathbf{S}$