1. Evaluate $\int \int \Sigma xy\,dS$, where $\Sigma$ is the triangular region with vertices $(1,0,0), (0,2,0)$, and $(0,0,2)$.

2. Evaluate $\int \int \Sigma y\,dS$, where $\Sigma$ is the surface $z = \frac{2}{3}(x^{3/2} + y^{3/2})$, and $0 \leq x \leq 1, 0 \leq y \leq 1$.

3. Evaluate $\int \int \Sigma x^2 + y^2 + z^2\,dS$, where $\Sigma$ is the part of the cylinder $x^2 + y^2 = 9$ between the plane $z = 0$ and $z = 2$, including the top and bottom faces.

4. Evaluate $\int \int \Sigma \vec{F} \cdot \,d\vec{S}$, where $\vec{F}$ is the vector field $xi + yj + zk$ and $\Sigma$ is the part of the cone $z = \sqrt{x^2 + y^2}$, beneath the plane $z = 1$ with downward orientation.

5. Evaluate $\int \int \Sigma \vec{F} \cdot \,d\vec{S}$, where $\vec{F}$ is the vector field $xze^y i + -xze^y j + zk$ and $\Sigma$ is the part of the plane $x + y + z = 1$ in the first octant with downward orientation.

6. A fluid has density $900 \text{kg/m}^3$ and flows with velocity $\vec{v} = zi + y^2j + x^2k$, where distance is measured in meters and time in seconds. Find the rate of flow outward through the cylinder $x^2 + y^2 = 4, 0 \leq z \leq 1$.

7. Use Gauss’s law ($Q = \varepsilon_0 \int \int \Sigma \vec{E} \cdot \,d\vec{S}$) to calculate the charge enclosed by the cube with vertices $(\pm1, \pm1, \pm1)$ if $\vec{E}$ is $xi + yj + zk$. 