

16 For lecture on 12/3

1. Evaluate the surface integral $\iint_S \vec{F} \cdot d\vec{S}$, where $\vec{F} = (x^2y, xy^3, 2xyz)$ and S is the surface given by $z = 2x^2y$, $0 \leq x \leq 1$, $0 \leq y \leq 2$, oriented downwards.
2. Compute $\iint_S \vec{F} \cdot d\vec{S}$, where $\vec{F} = (2x + 3y, -4y - 3z, 4z)$ and S consists of the paraboloid $z = x^2 + y^2$, $0 \leq z \leq 1$ oriented upwards, and the disk $x^2 + y^2 \leq 1$, $z = 1$ oriented downwards.
 - (a) Compute directly.
 - (b) By using divergence theorem.