

1. Let S be the surface of the cone parametrized by $\vec{r}(s, t) = 2s \cos(t)\vec{i} + 2s \sin(t)\vec{j} + (3 - \frac{3s}{2})\vec{k}$, $0 \leq s \leq 2$, $0 \leq t \leq 2\pi$, oriented upward. Let $\vec{F}(x, y) = y\vec{i} + x\vec{j} + x\vec{k}$. Compute $\int_S \vec{F} \cdot d\vec{A}$.
2. Let S be the surface parametrized by $\vec{r}(s, t) = (s + t)\vec{i} + (s - t)\vec{j} + (s^2 - 2t^2)\vec{k}$, $0 \leq s \leq 2$, $0 \leq t \leq 1$, oriented upward. Let $\vec{F}(x, y) = x\vec{i} + y\vec{j} + y\vec{k}$. Compute $\int_S \vec{F} \cdot d\vec{A}$.