Calculus III
Homework on Lecture 20

1. Use the divergence theorem to compute the flux of $\mathbf{F}$ through the surface $\mathcal{S}$.

   (a) $\mathbf{F} = \mathbf{k}$, $\mathcal{S}$ is the hemisphere, oriented upwards, with radius 1, whose axis is the z-axis and whose base lies in the x, y-plane.

   (b) $\mathbf{F} = (x^2 + y^2)\mathbf{k}$, where $\mathcal{S}$ is the part of the paraboloid with equation $z = 1 - x^2 - y^2$ that lies above the x, y-plane. $\mathcal{S}$ is oriented upwards.