1. Find the flux of $\vec{F} = z^2\,\hat{k}$ through the upper hemisphere of the sphere $x^2 + y^2 + z^2 = 25$, oriented away from the origin.

2. Let $\vec{H} = (e^{xy} + 3z + 5)\,\hat{\imath} + (e^{xy} + 5z + 3)\,\hat{\jmath} + (3z + e^{xy})\,\hat{k}$. Calculate the flux of $\vec{H}$ through the square of side 2 with one vertex at the origin, one edge along the positive y-axis, one edge in the xz-plane with $x > 0$, $z > 0$, and with normal $\vec{n} = \hat{\imath} - \hat{k}$.