1. Find the surface area of the torus obtained from rotating the circle in yz-plane $(y-b)^2+z^2=a^2$ around z-axis, where $0<a<b$ are constants

2. Evaluate
$$\iint_S x^2z+y^2z\,dS$$
where S is the hemisphere $x^2+y^2+z^2=4$, $z\geq 0$.

3. A surface S is parameterized by $\vec{r}(\theta,z)=(\cos\theta,\sin\theta,z)$, $0\leq\theta\leq 2\pi,-1\leq z\leq 1$. It is orientation agrees with $\frac{\partial\vec{r}}{\partial\theta}\times\frac{\partial\vec{r}}{\partial z}$

   (i). What surface is it geometrically?

   (ii). If $\vec{F}(x,y,z)=(-y,x,z)$, evaluate
$$\iint_S \vec{F}.d\vec{S}$$

   (iii). Can you explain the result you obtained in (ii) geometrically?

4. If S is the part of the graph of a smooth function $z=f(x,y)=1-x^2-y^2$ above xy-plane with upward orientation, $\vec{F}(x,y,z)=(y,x,z)$, compute
$$\iint_S \vec{F}.d\vec{S}$$

5. Evaluate the surface integral $\iint_S \vec{F}.\,d\vec{S}$, where $\vec{F}=<x,-z,y>$ and S is the part of the sphere $x^2+y^2+z^2=4$ in the first octant, with orientation pointing towards the origin.