Let S be the the part of the surface $z = \sqrt{x^2 + y^2}$ in the first octant below $z = 1$.

(a) Compute the surface integral $\displaystyle\iint_S xyz \, dS$.

(b) Compute the flux integral $\displaystyle\iint_S \mathbf{F} \cdot \mathbf{n} \, dS$ where $\mathbf{F} = x\mathbf{i} + y\mathbf{j} + z\mathbf{k}$, and $\mathbf{n}$ is the *downward* unit normal.