1. (§15.5, #19, 10 points) Evaluate the following triple integral using cylindrical coordinates.

\[
\int_0^1 \int_0^{\sqrt{3}/2} \int_z^{\sqrt{1-z^2}} e^{-r^2-z^2-\rho^2} \, dy \, dz \, dr
\]

2. (§15.5, #35 & 38, 10 points) Identify and sketch the following sets in spherical coordinates.

(a) \(\{(\rho, \varphi, \theta) : 1 \leq \rho \leq 3\}\)

(b) \(\{(\rho, \varphi, \theta) : \rho = 2 \sec \varphi, 0 \leq \varphi \leq \pi/2\}\)

\[S = 2 \sec \varphi\]

\[\varphi = \cos^{-1}(\rho)\]