

3. Choose cylindrical poles,

$$\iint x \, dS = \int_0^1 \int_{-\pi/2}^{\pi/2} (a \cos \phi) a \, d\phi \, dz$$

$$= a^2 \int_0^1 dz \int_{-\pi/2}^{\pi/2} \cos \phi \, d\phi$$

$$= a^2 \left[\sin \phi \right]_{-\pi/2}^{\pi/2}$$

$$= \underline{2a^2}$$