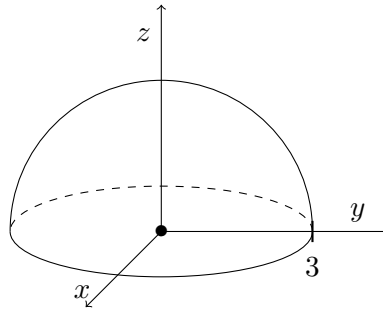


3. [15 points] Consider a hemisphere of radius 3m shown below. The hemisphere is filled to the top with water. The density of the water is 1000 kg/m^3 .



- a. [4 points] Find an expression for the mass of a circular slice of thickness Δz that is z meters above the base of the hemisphere.

Mass = _____

- b. [7 points] What is the center of mass of the hemisphere of water? Justify your answers. Please limit any verbal explanation to a sentence or two.

\bar{x} = _____

\bar{y} = _____

\bar{z} = _____

- c. [4 points] Suppose water is evaporating from the hemisphere and the height of the water is decreasing at a constant rate of 1 m/day. Assuming $0 \leq t < 3$, write an expression involving integrals which gives the z -coordinate of the center of mass of the water, t days after the water started evaporating. Do not evaluate any integrals.