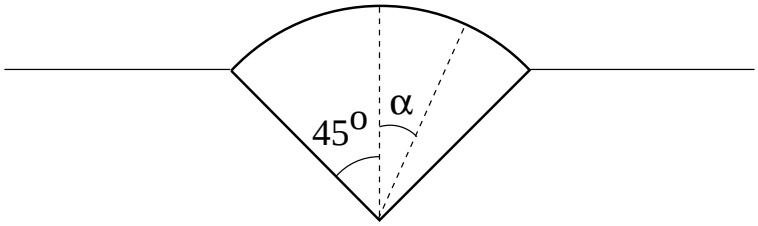
[mex113] Design of a lawn sprinkler

The lawn sprinkler is to consist of a spherical cap with cross section as shown. The spherical surface is perforated with a large number of small holes through which water jets are ejected with initial speed v_0. How must the holes be distributed so that a circular area around the sprinkler is watered uniformly? Express this distribution a function $n(\alpha)$ describing the number of holes per unit area on a ring at angle α from the vertical. The size of the cap is small compared to the area being sprinkled and the cap is about level with the lawn. Air resistance is assumed to be negligible.



Solution: