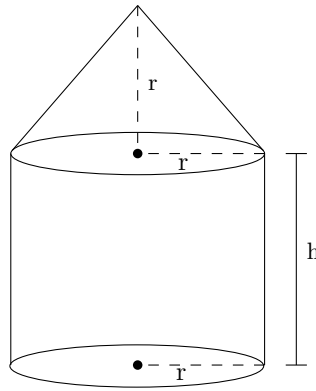


7. [9 points]



A city is in the planning stages of building a shed to store road salt. One design being considered is shown above. The sides would be a cylinder of radius r feet and height h feet, and the roof would be a cone in which both the radius and height are equal to r feet. (The city does not need to build a floor.) The cost of the materials for this shed, in dollars, is

$$4\pi r^2 + 4\pi r h.$$

If the city wants to spend \$20,000 on materials, what values of r and h will maximize the volume of the shed? Give your answers to at least two decimal places, and be sure to find and justify your answers using calculus.

Note that the volume of a cone with radius R and height H is $\frac{1}{3}\pi R^2 H$.