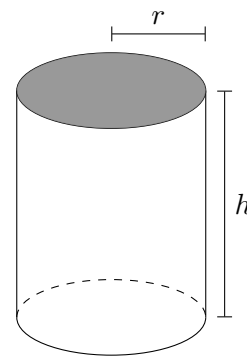


4. [8 points]

Alana is designing a new prototype for her Stan Lee cups. The new cups are cylindrical in shape, with metal sides and base, and a circular lid made from silicone. If the cylinder has height h centimeters, and radius r centimeters, then the surface area of the metal part is $2\pi rh + \pi r^2$ square centimeters, and the surface area of the silicone part is πr^2 . The metal costs 2 cents per square centimeter, and the silicone costs 3 cents per square centimeter. Alana spends a total of 300 cents on materials for each cup.



a. [3 points] Find a formula for h in terms of r .

Answer: $h =$ _____

b. [1 point] Recall that the volume of a cylinder of radius r and height h is $V = \pi r^2 h$.

Write a formula for $V(r)$, the volume of one of the cups in cubic centimeters, as a function of r only. *Your formula should not include the letter h .*

Answer: $V(r) =$ _____

c. [4 points] Alana wants to ensure that the height of a cup is at most 2 and a half times its radius, that is, she wants $h \leq 2.5r$. Given this constraint, find the domain of $V(r)$ in the context of this problem.

Answer: _____