Injection Molding Problems

Problem 1

Consider a mold used to make a spherical part. The volume of the mold is

\[ V = \frac{4}{3} \pi R^3 \]

where \( R = 2 \) cm.

Melt density (300 °C) of the PET used to fill the part is \( \rho_m = 1.2 \text{ gm/cm}^3 \) while the density at room temperature (20 °C) is 1.33 gm/cm\(^3\). Assume density is linear with respect to temperature. If the part shrinks uniformly, what is the volume of the part if it is removed from the mold at a temperature of 70 °C?

What would be the gap between the part and the mold wall?

Problem 2

Assume the above part has a radius of 2 cm. The cooling time necessary to bring the part temperature down from the melt temperature of 300 °C to 70 °C, where it can be removed from the mold, is 4 minutes. If the part radius is reduced to 1.5 cm (25% less) then what is your estimate of the new cooling time?