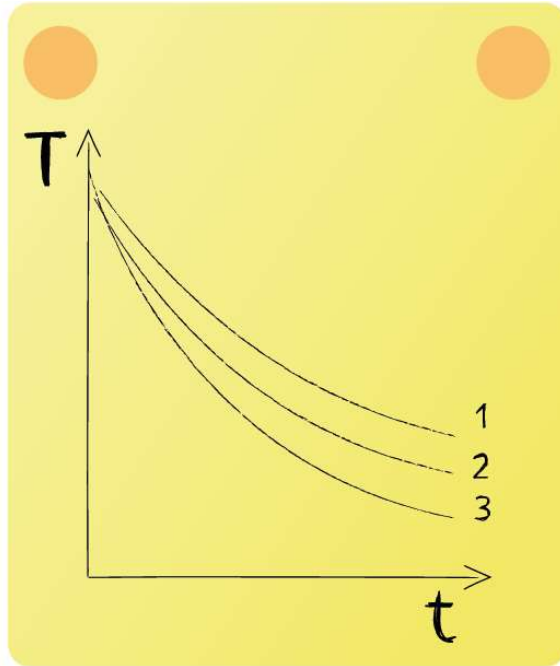# Lecture 6 - Question 4

A sphere, a cube and a thin circular plate, all made of the same material and having the same volume are initially heated up above room temperature. Afterwards they are left at room temperature. Assume all three to have a homogeneous temperature distribution. Radiation can be neglected. Which temperature profile do you expect to belong to which object?

When having a homogeneous temperature distribution, the change in body temperature is determined by the rate of heat loss. Heat is lost due to convection.

$$\dot{Q}_{conv} = \alpha \cdot A_s \cdot (T_w - T_\infty)$$

. Since they are under the same environmental conditions $\alpha_{sphere} \approx \alpha_{plate} \approx \alpha_{cube}$. For the surface Since the bodies are of the same volume, the relation of their surface areas is only depending on their shapes, yielding: $A_{plate} > A_{cube} > A_{sphere}$. Which is the order of fastest to slowest cool down.