1. In the lecture you have seen how the Reynolds transport theorem can be used to derive the diffusion equation from conservation of mass and Fick’s law. Use the same theorem (and conservation of mass) to derive the continuity equation for convection:
\[
\frac{\partial \rho}{\partial t} + \nabla \cdot (\rho \mathbf{u}) = 0
\]  
(K3)

2. Can an intensive property be conserved? Explain why! Two to three sentences should be enough. (K2)
3. What is the difference between a Eulerian and a Lagrangian control volume? One sentence highlighting a key difference is sufficient here. (K1)

4. Write down the equation for the material derivative of a scalar quantity $f$ in terms of Eulerian derivatives! (K1)

5. A friend of yours who has no idea about numerics comes across the term “finite volume method”. Use your knowledge on control volume methods and conservation laws to explain him the method. Pay attention to use an intuitive and physical explanation. Equations are forbidden here! (K2)