Hydrodynamics
Homework 4: Incompressibility
31. October 2024

Problem:
Prove the equality

$$\frac{\mathrm{d}}{\mathrm{d}t} \int_{\mathcal{V}(t)} \rho f \, \mathrm{d}v = \int_{\mathcal{V}(t)} \rho \frac{\mathrm{d}f}{\mathrm{d}t} \, \mathrm{d}v,$$

where ρ is the density, f is a smooth function and $\mathcal{V}(t)$ is a volume of the fluid at time t. You can use any formulas from the tutorial.