1. Consider the motion of an inviscid homogeneous incompressible fluid ($\mathbb{T} = -p\mathbb{I}$) moving in the absence of body forces. Show that
$$\frac{\mathrm{d}}{\mathrm{d}t} \int_{\gamma(t)} \boldsymbol{v} \bullet \mathrm{d}\boldsymbol{x} = 0,$$
where $\boldsymbol{v}$ denotes the Eulerian velocity field and $\boldsymbol{\gamma}(t)$ is an arbitrary closed curve moving with the fluid, that is $\boldsymbol{\gamma}(t) = \boldsymbol{\chi}(\boldsymbol{\Gamma}(s), t)$, where $\boldsymbol{\Gamma}(s)$ is a closed curve in the reference configuration.