1. Consider the deformation $\boldsymbol{x} = \boldsymbol{\chi}(\boldsymbol{X}, t)$ given by the following formulae

$$
\begin{aligned}
\mathrm{x}_1 &= \lambda(t)\mathrm{X}_1, \\
\mathrm{x}_2 &= [\lambda(t)]^{-\frac{1}{2}}\,\mathrm{X}_2, \\
\mathrm{x}_3 &= [\lambda(t)]^{-\frac{1}{2}}\,\mathrm{X}_3,
\end{aligned}
$$

where $\lambda(t)$ is a positive function of time, $\lambda(t_0) = 1$. Find the explicit formulae for the Lagrangian velocity field $\boldsymbol{V}$, Eulerian velocity field $\boldsymbol{v}$, deformation gradient $\mathbb{F}$, stretch tensor $\mathbb{U}$ and rotation tensor $\mathbb{R}$ from the polar decomposition of $\mathbb{F}$, velocity gradient $\mathbb{L}$, symmetric part of the velocity gradient $\mathbb{D}$, left Cauchy–Green tensor $\mathbb{B}$, right Cauchy–Green tensor $\mathbb{C}$ and Green–Saint-Venant strain $\mathbb{E}$.

Is the deformation isochoric? (Isochoric = preserves volume.)