1. Compute $\delta_{ij}\delta_{jk}\delta_{ki}$
2. Use suffix notation to show

$$(\vec{a} \times \vec{b}) \times \vec{c} + (\vec{b}.\vec{c})\vec{a} = \vec{a} \times (\vec{b} \times \vec{c}) + (\vec{a}.\vec{b})\vec{c}$$

3. Use suffix notation to show $\vec{\nabla} \times (f\vec{\nabla} f) = 0$
4. Use suffix notation to show $\vec{\nabla}.(\nabla^2\vec{u}) = \nabla^2(\vec{\nabla}.\vec{u})$
5. An equation is given in terms of the suffix notation as

$$u_t \frac{\partial u_i}{\partial x_t} = \frac{1}{2}\frac{\partial (u_k u_k)}{\partial x_i} - \epsilon_{ijk}\epsilon_{klm} u_j \frac{\partial u_m}{\partial x_l}$$

(i). Write this equation in vector form.

(ii). Prove this equation.