1. **(10 pts)** Derive the transformation law for first-order tensors:

   \[ A_i = a_{ji} A'_j \]

2. **(10 pts)** Making use of the laws of transformation for Cartesian tensors, prove the orthonormal condition that

   \[ a_{ik} a_{jk} = \delta_{ij} \]

3. **(10 pts)** Using index notation, prove the identity that

   \[ A \cdot (\nabla \times B) = \nabla \cdot (B \times A) + B \cdot (\nabla \times A) \]