

MEEG 4703 [Quiz t1.183](#)

1. (10 pts) Making use of the laws of transformation for first-order Cartesian tensors, prove the *orthonormal condition*

$$a_{ik} a_{jk} = \delta_{ij}$$

2. (10 pts) Making use of the laws of transformation for second-order Cartesian tensors, prove that the trace of the stress tensor at point P of a machine is an *invariant* under rotations of the coordinate axes at point P ; i.e.,

$$\sigma_{ii} = \sigma'_{ii}$$

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

$$(\mathbf{A} \times \mathbf{B}) \cdot (\mathbf{C} \times \mathbf{D}) + (\mathbf{B} \times \mathbf{C}) \cdot (\mathbf{A} \times \mathbf{D}) + (\mathbf{C} \times \mathbf{A}) \cdot (\mathbf{B} \times \mathbf{D}) = 0$$
