MEEG 4703 Quiz t2. 183

1. (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.,

$$
\sigma_{i i}=\sigma_{i i}^{\prime}
$$

2. ( 10 pts ) Using index notation, prove the identity

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

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

$$
(\mathbf{A} \times \mathbf{B}) \cdot(\mathbf{B} \times \mathbf{C}) \times(\mathbf{C} \times \mathbf{A})=(\mathbf{A} \cdot \mathbf{B} \times \mathbf{C})^{2}
$$

