Math 335-002
Homework #21
Due date: April 28, 2008

1. Given the transformation rule for vectors, $u'_i = L_{ik} u_k$, show that the dot product of two vectors does not change under this transformation, and therefore it is a scalar (see Example 7.1 on p. 118)

2. Problem 7.3 on p. 121: given that a and b are vectors, show that the quantity $a_i b_j$ is a second-rank tensor, that is find the transformation rule for this matrix and show that it agrees with (7.13)

3. Problem 7.9 on page 121: if Q_{ijkl} is a tensor of rank 4, show that Q_{ijjl} is a tensor of rank two (derive the transformation rule for Q_{ijjl} in terms of L_{ij})

4. Prove that the rank-4 tensor $\delta_{ij}\delta_{kl}$ is isotropic (i.e. show that it remains invariant under an orthogonal transformation L).