Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Student number\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Assignment 3 (2p)**

Determine , , ,  ja when the components of tensors ,  and  in the orthonormal  basis are

,  and .

**Solution template**

The inner products of the basis vectors ,  and  all the other combinations giving zeros. The double inner product should be treated just as two inner products by keeping the positions of the multiplication operator with respect to vectors. Therefore, in the vector identity , the first inner product between  and  produces a scalar which can be moved in front of the expression. What remains is the inner product between  and .

In conjugate  to  the component matrix is transposed which corresponds to order change in all the dyads   of the tensor representation. Representations of , , ,  and the second order unit tensor in basis

,

,

,

,

.

Evaluation of a tensor product expressions consist of (I) substitution of the representations, (II) term-by-term expansion, (III) evaluation of the terms, (IV) simplification and/or restructuring the outcome.

Double inner product  produces a scalar

(I)  

(II)  

(III)  

(IV) . 🡸

Double inner product  produces a scalar

(I)  

(II)  

(III)  

(IV) . 🡸

Double inner product  produces a scalar

(I)  

(II)  

(III)  

(IV) . 🡸

Inner product  produces a vector

(I)  

(II)  

(III)  

(IV) . 🡸

Inner product  produces a second order tensor

(I)  

(II)  

(III)  

(IV) . 🡸