# Homework 1. Continuum mechanics

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1. **Problem 1.**

Considering that [𝑇] and [𝐸] are 3x3 matrices and find.

1. **Problem 2.**

Find , if and compare the results to , where is the basis.

As a result, .

1. **Problem 3**

Prove (for help refer to the lectures, make it as short as possible). Using the equation proved, find a) ; b) .

Where , transposing the second determinant does not change its value, after that:

1. **Problem 4.**

The components of a tensor in the old coordinate system are

Find the tensor components in a primed coordinate system with a right-handed basis . It is known that is collinear with vectorin the same direction, and that .  
  
Let’s find is known  may be obtained by summing up:   
For tensor transformation we have:

1. **Problem 5.**

The components of a tensor are

Find the symmetric part and the antisymmetric part of 𝐓.

- symmetric part-antisymmetric part

1. **Problem 6.**

A tensor 𝐓 is represented by the following matrix:

Find the principal values of the tensor and their corresponding principal directions. Also find the

principal scalar invariants .

For let’s make it unit:

Analogically for ::

Summing up: - matrix of principal directions, for corresponding principal values: . Decomposition:

For both and are the same.