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

**Assignment 1**

Calculate the strain and stress components of the element shown with the thin-slab model in the plane if the use of FEM gives the displacement components , ,  and , ,  in which , , and  are constants.

3

1

2

*x*

*y*

*h*

*h*

**Solution template**

The strain-displacement and strain-stress relationships of the thin-slab model are given by

 and .

Let us start with interpolation of the nodal values inside the element. Shape functions in terms of ,  and element size  (may be deduced using the definition: simplest possible polynomials taking the value one in one node and vanishing at all the other nodes)

, , .

Displacement components  and  in the  and  directions in terms of the shape functions and the nodal values

, .

Derivatives of  and  with respect to  and 

, , , .

Strain components follow from the strain definition

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Stress components follow from the stress-strain relationship

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