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

**Assignment 1**

Determine the displacement of node 1 of the bar structure shown at the constant temperature . Use a linear approximation and assume that parameters , *A* andare constants. At the initial temperature , length of the bar is *L* and stress in the bar vanishes.

*X,x*

*L*

*Z,z*

2

1

1

**Solution template**

In stationary thermo-elasticity without external forces, the virtual work density of the bar model is given by

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Linear interpolants to axial displacement  and temperature change  are

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When  and  are substituted there, virtual work density simplifies to

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Integration over the element gives

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Principle of virtual work   and the fundamental lemma of variation calculus imply the nodal displacement

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