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

**Assignment 3**

*L*

2

*F*

1

2

*X*

*Z*

1

3

3

*x*

*x*

*z*

*z*

2*L*

Determine horizontal and vertical displacements of node 2 of the bar structure shown. The cross-sectional area of the bars and Young’s modulus of the material are  and *E*.

**Solution template**

Element contribution written in terms of displacement components of the structural coordinate system

****, where ****

depends on the cross-sectional area , Young’s modulus ,bar length, force per unit length of the bar  in the direction of the axis, and the components of the basis vector  in the structural coordinate system.

Element contributions are first written in terms of the nodal displacements of the structural coordinate system (notice that the point force is treated as a one-node element)

Bar 1: ****, ****, ****,

Bar 2: ****, ****, ****,

Force 3: ****.

In assembly of the system equations, the forces acting on the non-constrained node 2 are added to get the equilibrium equations in terms of displacement components

**.**

The unknown displacement components are obtained as the solution to the equilibrium equations

****  and  **** .  **🡸**

Use the code of MEC-E1050 to check your answer!