ETH	
Eidgenössische Technische Hochschule Zürich Swiss Federal Institute of Technology Zurich	

Lecture "Methods of Finite Elements I" Prof. Dr. M. H. Faber

Name :	••
Stud. Nr.:	•
Date :	

## Assignment 2

## 1. Cantilever Beam

A) Calculate the local stiffness matrix for a shear stiff beam element. The element and the corresponding degrees of freedom are given in Figure 1.

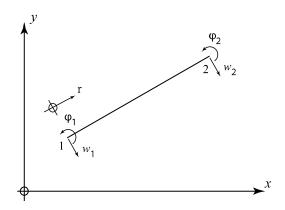
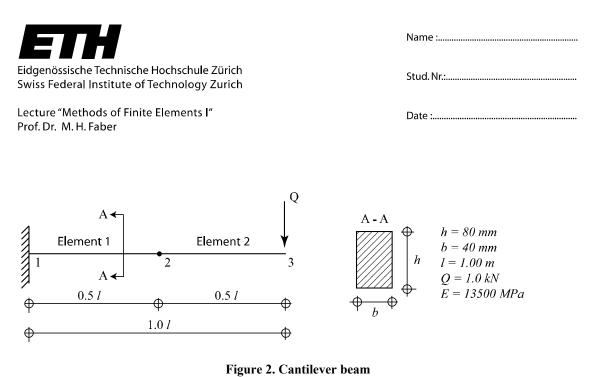


Figure 1. Beam element

## Hint:

$$w(r) = a_1 + a_2 r + a_3 r^2 + a_4 r^3$$
  
 $r_1 = 0, \quad r_2 = 1$   
 $x_2 - x_1 = L$ 

 B) Calculate the global stiffness matrix for the two element cantilever beam given in Figure 2. Use local stiffness matrix for a shear stiff beam element derived in part A)



- 0
- C) Calculate the displacement of the two element cantilever beam given in Figure 2 at the location 3 by using the global stiffness matrix calculated in part B).