Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

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

Name

Stud. Nr.: $\qquad$

Date $\qquad$

## 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)

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Figure 2. Cantilever beam
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).

