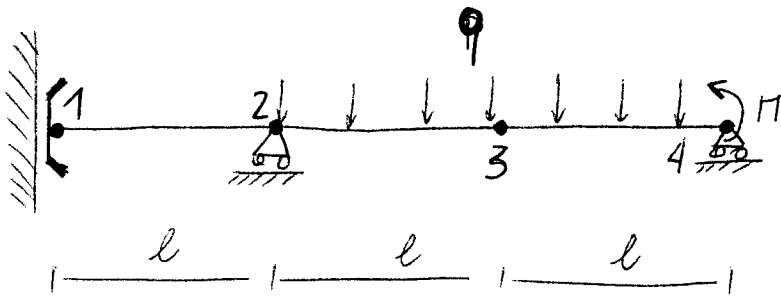


A303 FINITE ELEMENTSSOLUTION TO TUTORIAL QUESTIONS 5

3 elements

4 nodes  $\rightarrow$  8 potential dofs  $\left\{ \begin{array}{l} 4 \text{ rotations } \psi \\ 4 \text{ deflections } v \end{array} \right.$

Only 5 dofs can assume non-zero values

$v_1$   $\psi_2$   $v_3$   $\psi_3$   $\psi_4$

The structural stiffness matrix is  $5 \times 5$ .

The element stiffness matrix is:

$$[K_{el}] = \frac{EI}{l^3} \begin{bmatrix} 12 & 6l & -12 & 6l \\ 6l & 4l^2 & -6l & 2l^2 \\ -12 & -6l & 12 & -6l \\ 6l & 2l^2 & -6l & 4l^2 \end{bmatrix} \begin{bmatrix} v_1 \\ \psi_1 \\ v_2 \\ \psi_2 \end{bmatrix}$$