

## EG3111 Finite Element Analysis and Design

### Exercise sheet #3: Bar Elements

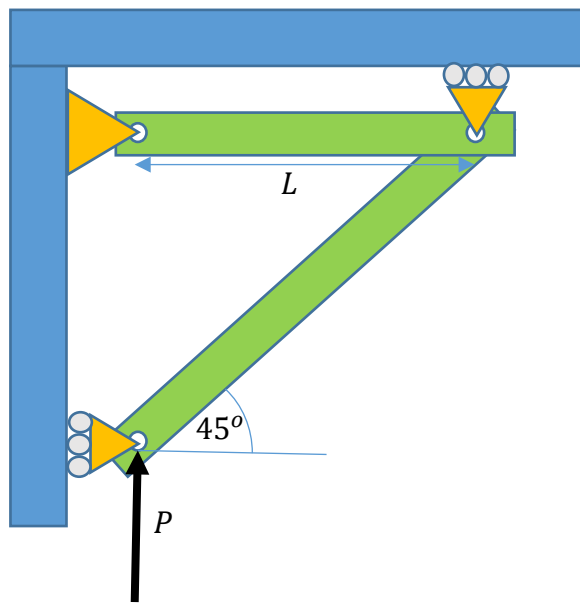
#### Questions

Use the general elemental stiffness matrix for a bar element

$$[k^e] = \frac{EA}{L^e} \begin{bmatrix} \cos^2 \theta & \cos \theta \sin \theta & -\cos^2 \theta & -\cos \theta \sin \theta \\ \cos \theta \sin \theta & \sin^2 \theta & -\cos \theta \sin \theta & -\sin^2 \theta \\ -\cos^2 \theta & -\cos \theta \sin \theta & \cos^2 \theta & \cos \theta \sin \theta \\ -\cos \theta \sin \theta & -\sin^2 \theta & \cos \theta \sin \theta & \sin^2 \theta \end{bmatrix}$$

to solve the following framework problems.

1. Find the unknown displacements and the reactions at the nodes for the following framework (note that the geometry is the same as the example covered in the lecture).



2. Find the unknown displacements at the nodes only for the following framework

