

1. a) **What is a node?**  
 b) **What is your inference if the global stiffness matrix is observed to be singular matrix?**
  - a) A node is a point at which the field variable is unknown and to be determined.
  - b) If the body is not constrained, the stiffness matrix becomes singular.
2. **In terms of natural coordinates, write the expressions for shape functions of one dimensional linear element.**

*Shape functions:*

$$N_i = \frac{1 - \xi}{2}$$

$$N_j = \frac{1 + \xi}{2}$$

i want to place the image here

Where  $\xi$  is a natural coordinate.

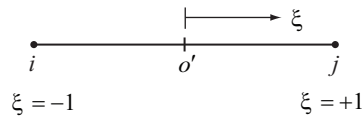


Figure 1: