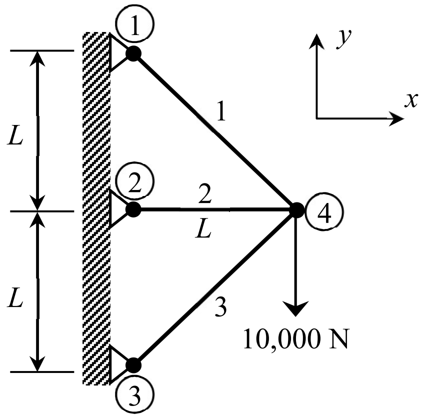
29. Use the finite element method to solve the plane truss shown below. Assume $AE = 10^6$ N, $L = 1$ m. Determine the nodal displacements, forces in each element and the support reactions.



22. The properties of the two elements of a plane truss are given in the table below. Note that an external force of 10,000 N is acting on the truss at node 2.

Elem.	$i \to j$	ϕ	l	m	L (m)	A (cm^2)	E (GPa)	α (/°C)	ΔT (°C)
1	$1 \to 2$	90	0	1	1	1	100	20×10^{-6}	-100
2	$2 \to 3$	0	1	0	1	1	100	20×10^{-6}	0

(a) Write the thermal force vector for each element. Indicate row addresses clearly.

(b) Assemble the thermal force vectors to form the global thermal force $\{\mathbf{F}_T\}$, which is a 2×1 matrix.

(c) Solve the problem for the unknown displacements. Determine the element force P in each element.

(d) Show that equilibrium is satisfied at node 2.