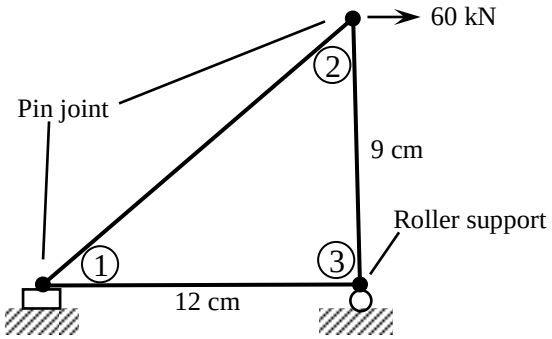
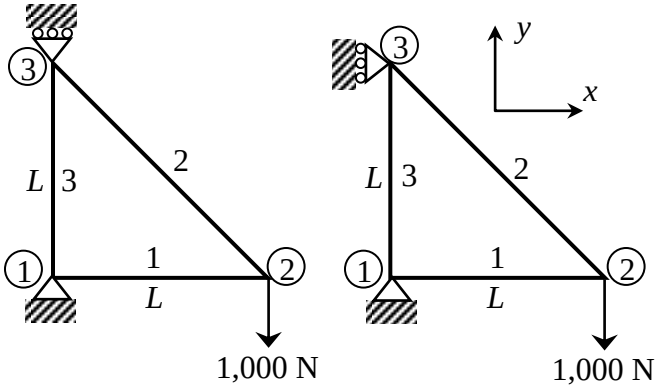
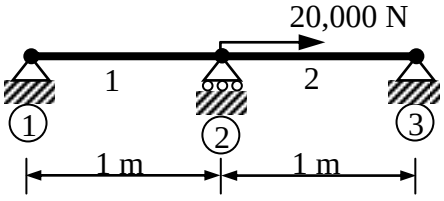
1. Solve Problem 1.3-3(c)
2. Solve Problem 2.2-2(b)
3. A two–dimensional truss shown in the figure is made of aluminum with Young's modulus E = 80 GPa and failure stress σ_Y = 150 MPa. Determine the minimum cross-sectional area of each member so that the truss is safe with safety factor 1.5.



4. It is desired to use FEM to solve the two plane truss problems shown in the figure below. Assume $AE = 10^6$ N, L = 1 m. Before solving the global equations, $[\mathbf{K}]\{\mathbf{Q}\} = \{\mathbf{F}\}$, find the determinant of $[\mathbf{K}]$. Does $[\mathbf{K}]$ have an inverse? Explain your answer.



5. In the 1D bar shown below, the temperature of **Element 2** is **<u>100 °C above</u>** the reference temperature, while Element 1 is in the reference temperature. An external force of 20,000 N is applied in the x-direction (horizontal direction) at Node 2. Assume $E = 10^{11}$Pa, $A = 10^{-4}$ m^2, and $\alpha = 10^{-5}$ /°C.



(a) Write down the stiffness matrices and thermal force vectors for each element.
(b) Write down the global matrix equations.
(c) Solve the global equations to determine the displacement at Node 2.
(d) Determine the forces in each element. State whether it is tension or compression.
(e) Show that force equilibrium is satisfied at Node 2