Q.3. Degrees of freedom of a stepped bar are constrained as shown in Figure 2. Each one of three segments of the stepped bar is made of a different material and must be taken as one element. Cross-sectional area, Young's modulus, and coefficient of thermal expansion of each material are shown in Figure 2. The temperature of the shaft is raised to +85°C. You may use Matlab to compute the following in each element or segment of the stepped bar.

a. Global matrix equations **[3 marks]**
b. nodal displacements and reaction forces and **[2 marks]**
c. element stresses **[2 marks]**

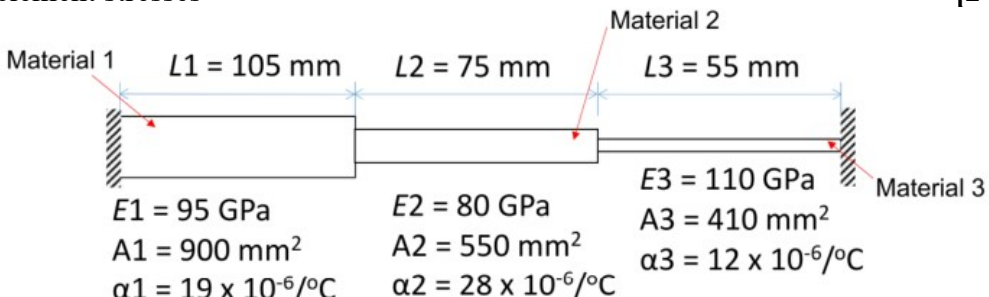

Figure 3