Example 2.5.1

a) A straight steel strut is subject to an axial compressive load. If the end conditions can be assumed to be such that there is no restriction on rotation. The cross-section is a solid rectangle measuring 25 mm × 10 mm. The Young's modulus of the material is 200 GPa, and its yield stress is 300 MPa. Calculate the critical failure load if the strut is (i) 500 mm long, or (ii) 200 mm long.

(Ans: 16.45 kN; 75 kN)

b) A solid circular cross section strut, diameter 30 mm, is 700 mm long, and is made of steel, Young's modulus 200 GPa, yield stress 300 MPa. Calculate the critical failure loads if the end conditions are (i) free-free, (ii) free-fixed and (iii) fixed fixed.