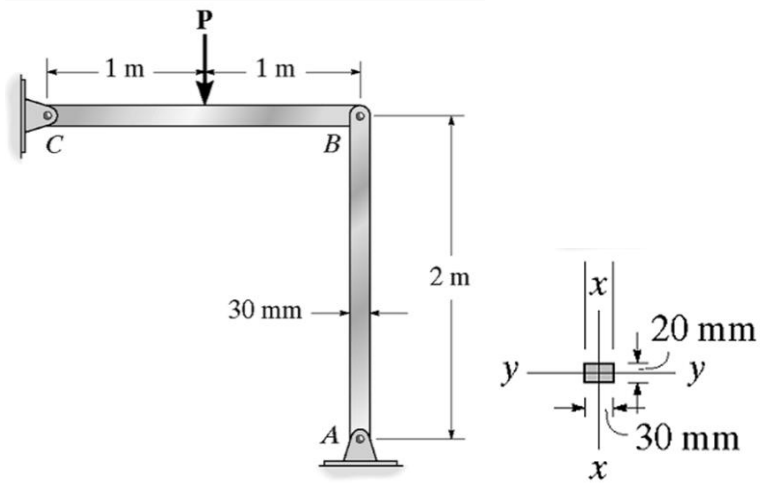
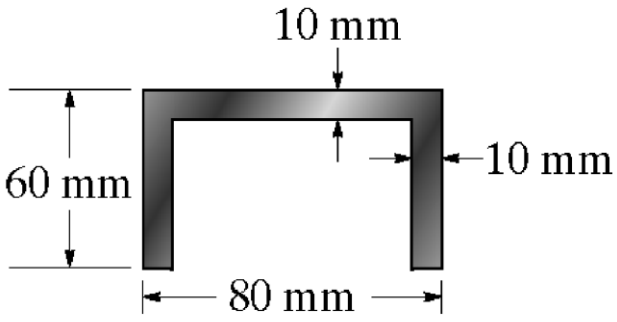
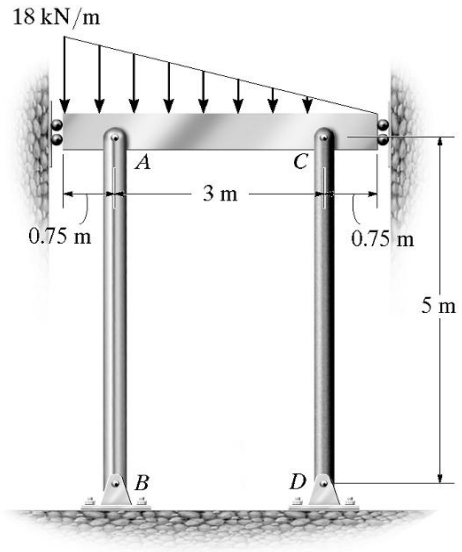
1. Determine if the frame can support a load of P = 20 kN if the factor of safety for member AB is 3. Assume that AB is made of steel and is pinned at its ends for x-x axis buckling and fixed at its ends for y-y axis buckling. E_{st} = 200 GPa, σ_p = 194 MPa, σ_Y = 222 MPa, σ_{cr} = 227 - $0.0033\lambda^2$ for intermediate columns.



2. A steel column has a length of 5 m and is free at one end and fixed at the other end. If the cross sectional area has the dimensions shown, determine the critical load. E_{st} = 200 GPa, σ_p = 194 MPa, σ_Y = 222 MPa, σ_{cr} = 227 - $0.0033\lambda^2$ for intermediate columns.



3. The distributed loading is supported by two pin-connected columns, each having a solid circular cross section. If *AB* is made of aluminum and *CD* of steel, determine the required diameter of each column so that both will be on the verge of buckling at the same time. E_{st} = 200 GPa, $(\sigma_p)_{st}$= 194 MPa, E_{al} = 70 GPa, $(\sigma_p)_{al}$= 100 MPa.



4. The steel bar *AB* has a rectangular cross section. If it is assumed to be pin connected at its ends, determine if member *AB* will buckle if the distributed load *w* = 2 kN/m. Use a factor of safety with respect to buckling of 1.5. E_{st} = 200 GPa, σ_p = 194 MPa.