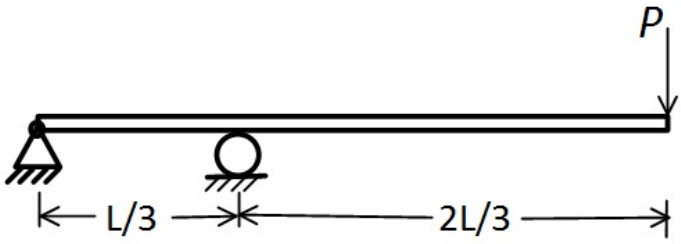
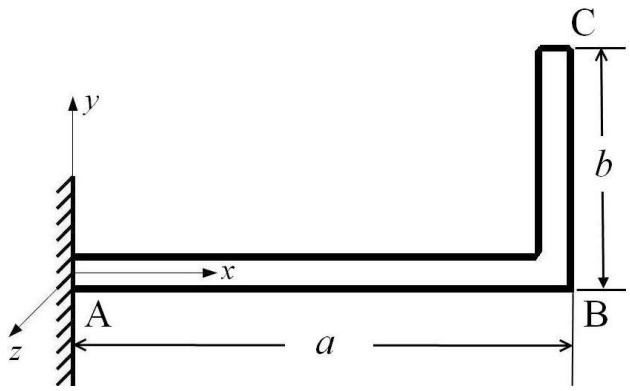
ME 202 Strength of Materials Spring 2023 Tutorial 5 Thu 09 Feb 2023
Use only the deflection method (NOT CT2) to solve the problems below.

1. Recall this problem (diving board) solved previously. Find the deflection at the point of application of the load P.



2. The bent beam ABC with circular cross-section shown below is rigidly fixed into the wall at A and free at C. Assume that the Young's modulus is E, shear modulus is G, cross-sectional area A, second moment of area I and polar moment of area J. Joint B is assumed to be rigid and AB and BC form a right angle at B. A point force P(Px, Py, Pz) is applied at point C where Px, Py, Pz are its components along the x, y, z coordinate axes. Find all the components of the total displacement of point C along the x, y, z coordinate axes. Clearly show free body diagrams of all relevant parts of the beam Do NOT ignore axial deflections.



2. Redo problem # 2 with a uniformly distributed load of intensity q acting in the z-direction. In this case, find the z-displacement of the point C.

3. The bent beam ABC with circular cross-section shown above is rigidly fixed into the wall at A and free at C. Assume that the Young's modulus is E, shear modulus is G, cross-sectional area A, second moment of area I and polar moment of area J. Joint B is assumed to be rigid and AB and BC form a right angle at B. A moment M(Mx, My, Mz) is applied at point C where Mx, My, Mz are its components along the x, y, z coordinate axes. Find all the components of the total displacement of point C along the x, y, z coordinate axes. Clearly show free body diagrams of all relevant parts of the beam Do NOT ignore axial deflections.