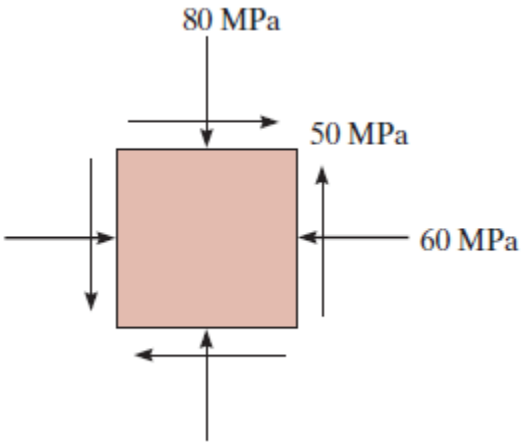
CHAPTER 9- TRANSFORMATION OF STRESS

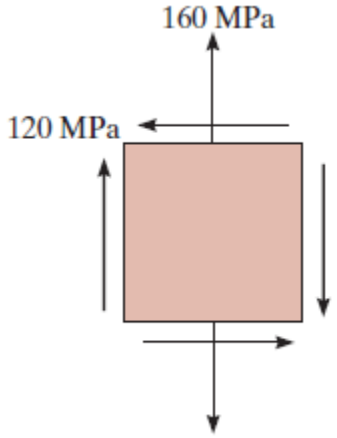
1- The state of stress at a point is shown on the element. Determine (a) the principal stress and (b) the maximum in-plane shear stress and average normal stress at the point. Specify the orientation of the element in each case. Show the results on each element.

(-19.0 MPa, -121 MPa, 39.3°, -50.7^0)



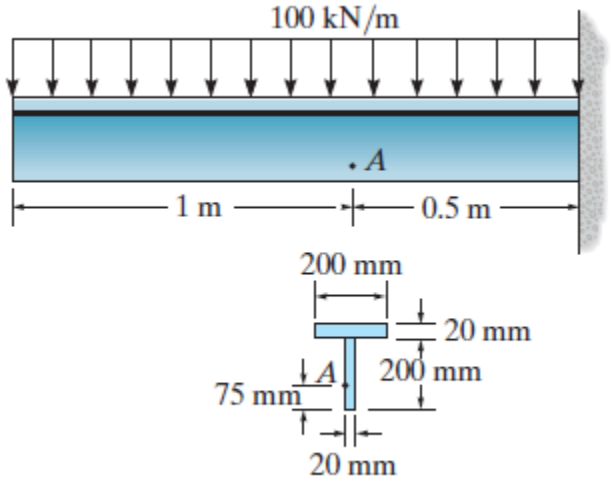
2- The state of stress at a point is shown on the element. Determine (a) the principal stress and (b) the maximum in-plane shear stress and average normal stress at the point. Specify the orientation of the element in each case. Sketch the results on each element.

(224 MPa, --64.2 MPa, -61.8°, 28.2°)



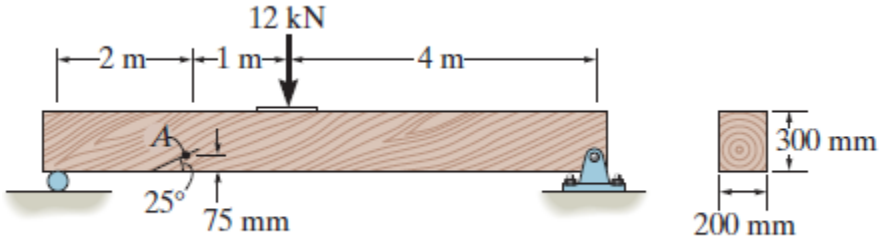
3- The T-beam is subjected to the distributed loading that is applied along its centerline. Determine the principal stress at point *A* and show the results on an element located at this point.

(4.93 MPa, -111 MPa)



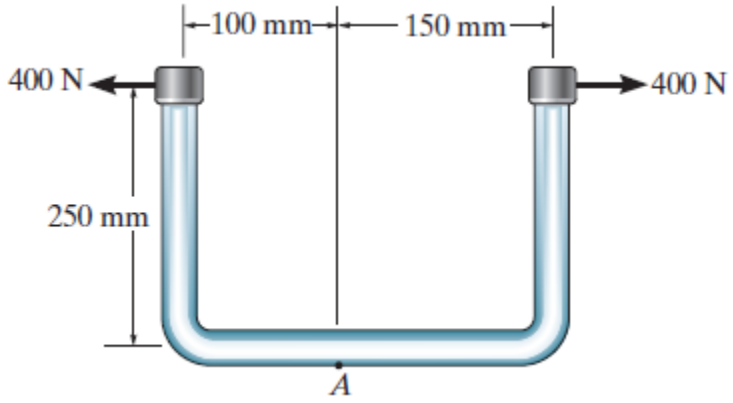
4- The wood beam is subjected to a load of 12 kN. Determine the principal stress at point *A* and specify the orientation of the element.

(2.29 MPa, -7.20 kPa)



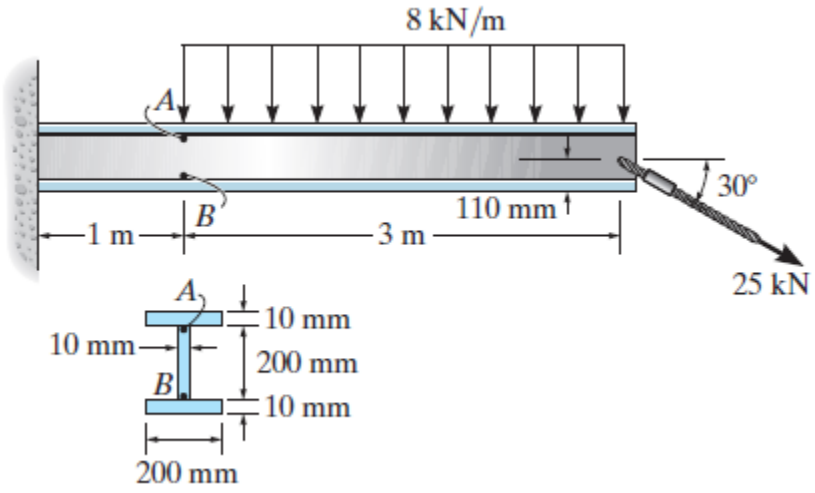
5- The bent rod has a diameter of 20 mm and is subjected to the force of 400 N. Determine the principal stress and the maximum in-plane shear stress that is developed at point *A*. Show the results on a properly oriented element located at this point.

(0, -126 MPa)



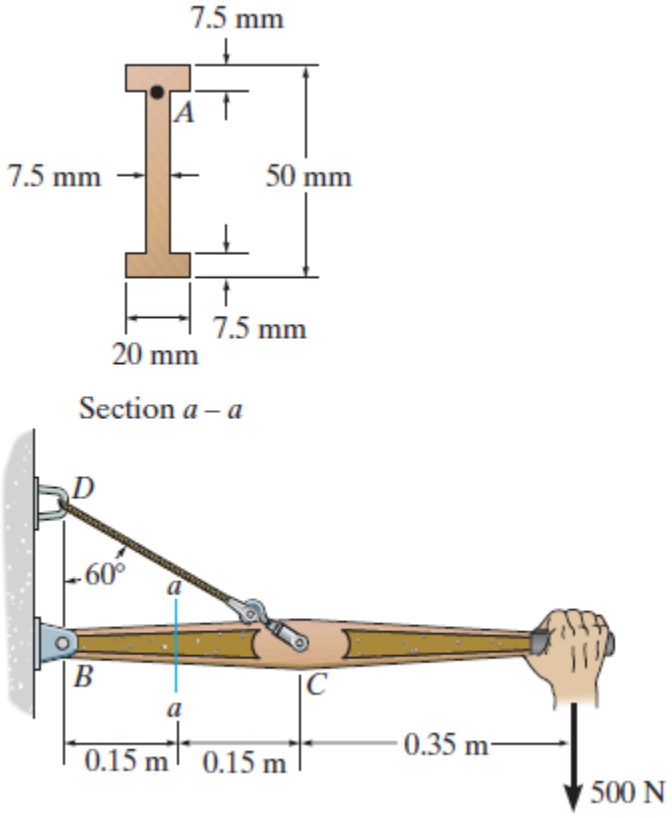
6- The wide-flange beam is subjected to the loading shown. Determine the principal stress in the beam at point *A* and at point *B*. These points are located at the top and bottom of the web, respectively. Although it is not very accurate, use the shear formula to determine the shear stress.

(1.60 MPa, -143 MPa)



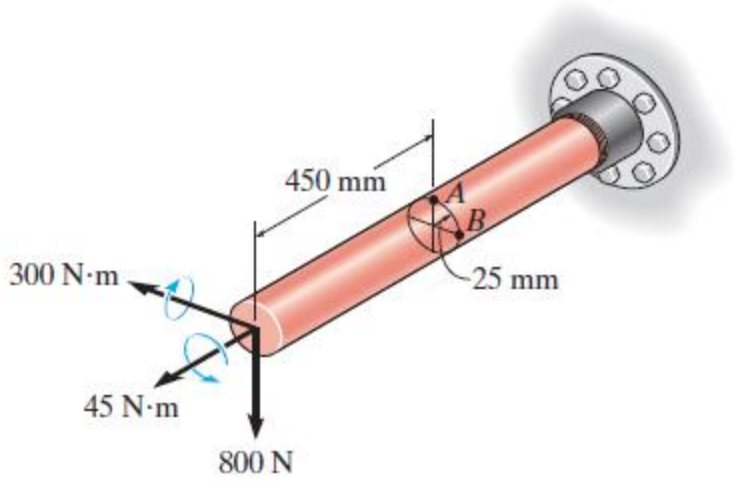
7- Determine the principal stress at point *A* on the cross section of the arm at section *a–a*. Specify the orientation of this state of stress and indicate the results on an element at the point.

(6.38 MPa, -0.360 MPa)



8- The solid shaft is subjected to a torque, bending moment, and shear force as shown. Determine the principal stresses acting at point *A*.

(5.5 MPa, -0.611 MPa)


450 mm
A
B
25 mm
300 N·m
45 N·m
800 N