

Student Name:				Number:
Q1: /10	Q2: /10	Q3: /10	Q4: /10	Total: /40

1. An aluminum alloy beam with the cross section shown in Figure 1 experiences positive bending by an applied moment M . The allowable stress is 150 MPa. Determine:
- The maximum moment that can be applied to the beam.
 - Stresses at point A, B, and C when maximum moment is applied.

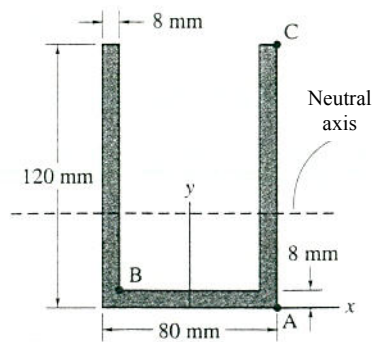


Figure 1

2. An element in plane stress is subjected to stresses as shown in Figure 2. Using Mohr's circle, determine:

- The stresses acting on an element oriented at an angle $\theta = 45^\circ$.
- The principal stresses.
- The angle of the principal stresses.
- The maximum and minimum shear stresses.
- The angle of the maximum shear stress.

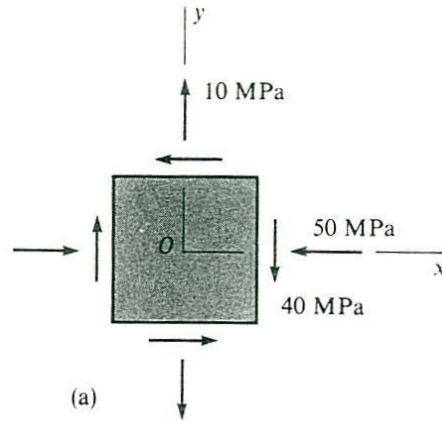


Figure 2

3. The simply supported beam shown in Figure 3a has a span length $L=3$ ft. The cross section is rectangular with width 1 in. and height 4 in. (Figure 3b). The total uniform load on the beam (including its weight) is $q=160$ lb/in. Calculate the following:
- The reaction loads acting at point A and point B .
 - The bending moment M and shear force V at the cross section through point C .
 - The normal stresses acting at point C .
 - The shear stresses acting at point C .
 - On an element, show the directions of the normal and shear stresses.

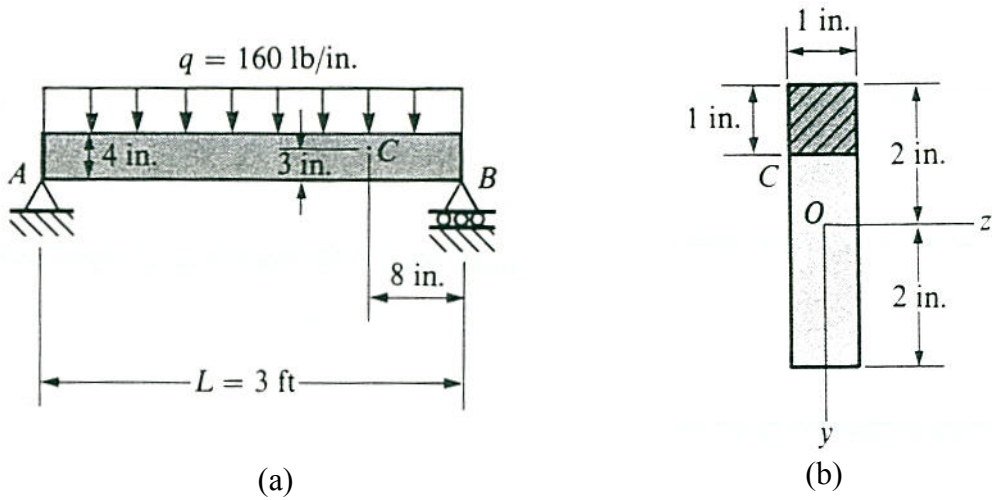


Figure 3

4. Using the SINGULARITY function, determine the shear force and bending moment equations for the beam shown in Figure 4 and plot the results.

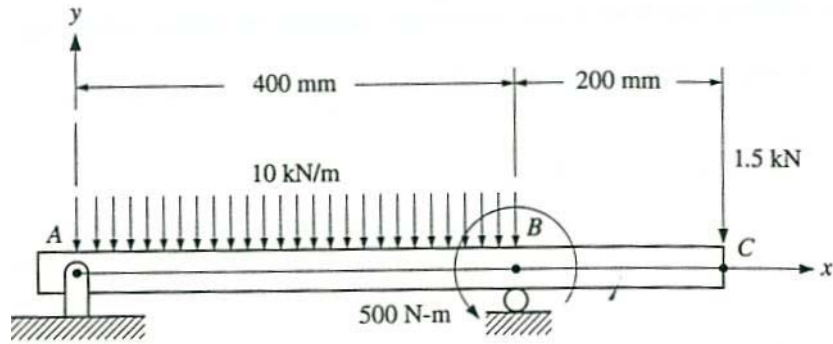


Figure 4

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