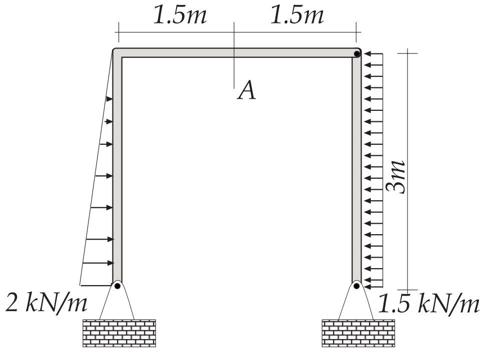
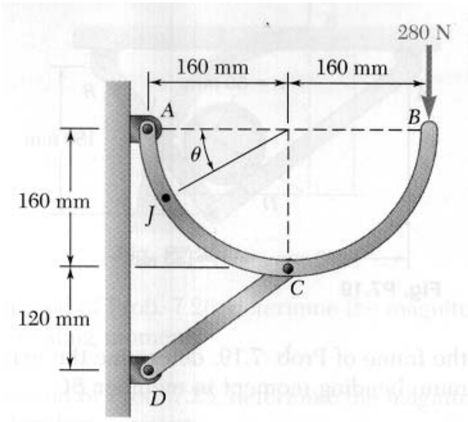
HOMEWORK 5

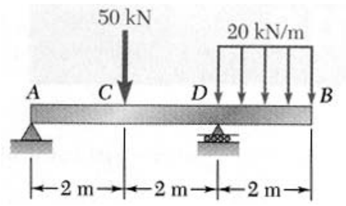
1. Determine the normal force N, shear force V, and the moment M at point A of the two-member frame.



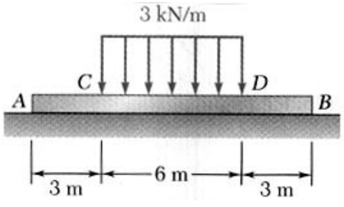
2. A semicircular rod is loaded as shown. Determine the magnitude and location of the maximum bending moment in the rod.



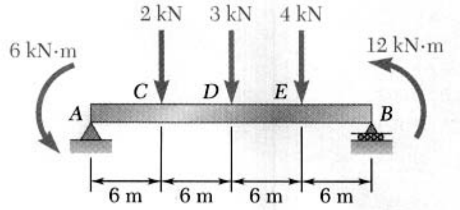
3. For the beam and loading shown, (a) draw the shear and bending moment diagrams, (b) determine the maximum absolute values of shear and bending moment.



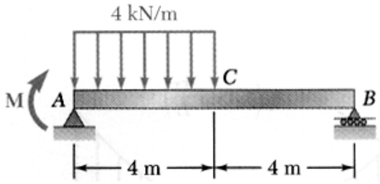
4. Assuming the upward reaction of the ground on the beam AB to be uniformly distributed, (a) draw the shear and bending moment diagrams, (b) determine the maximum absolute values of shear and the bending moment.



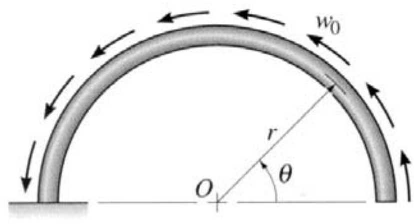
5. For the beam and loading shown, (a) draw the shear and bending moment diagrams, (b) determine the maximum absolute values of shear and bending moment.



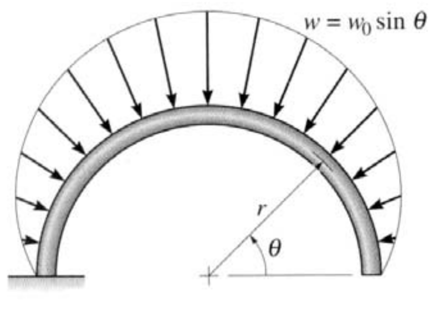
6. For the beam shown, draw the shear and bending moment diagrams, and determine the magnitude and location of the maximum absolute value of the bending moment, knowing that (a) $M=0$, (b) $M=24$ kNm



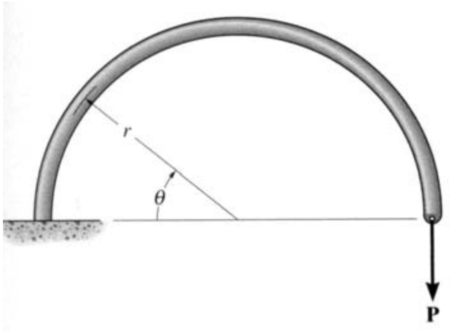
7. The semicircular arch is subjected to a uniform distributed load, along its axis, of w_o per unit length. Determine the internal normal force, shear force, and moment in the arch at $\theta = 120^o$.



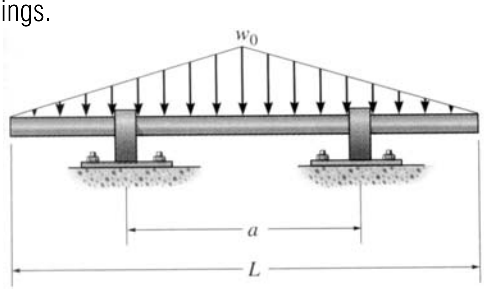
8. The distributed loading $w = w_o \sin\theta$, measured per unit length, acts on the semicircular rod. Determine the internal normal force, shear force, and moment in the rod at $\theta = 45^o$.



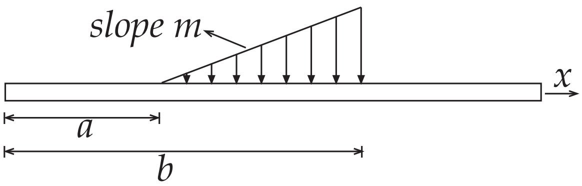
9. Determine the internal normal force, shear force, and moment in the semicircular rod as a function of θ.



10. Determine the distance *a* between the supports in terms of the shaft's length *L* so that the bending moment in the *symmetric* shaft is zero at the shaft's center. The intensity of the distributed load at the center of the shaft is w_o, and the supports are journal bearings.



11. Find the expressions for the internal shear and bending moment in the straight beam due to the triangular distributed load using *discontinuity functions*.



Answers

1. *N=-2.25kN, V=1.25kN, M=-1.88 kNm*
2. *45.2Nm* for $\theta = 82.9^o$
3. *40 kN*, *40kNm*
4. *4.5kN*, *13.5kNm*
5. *4.75kN*, *39kNm*
6. (a) *18kNm* at *3m* from *A*, (b) *34.1kNm* at *2.25m* from *A*
7. $N= -0.866rw_o$, $V=-1.5rw_o$, $M= 1.23r^2 w_o$
8. $N= 0.0759rw_o$, $V=0.278rw_o$, $M= 0.0759 r^2w_o$
9. $N=-P\cos\theta$, $V=P\sin\theta$, $M=-Pr(\cos\theta+1)$
10. *a=L/3*