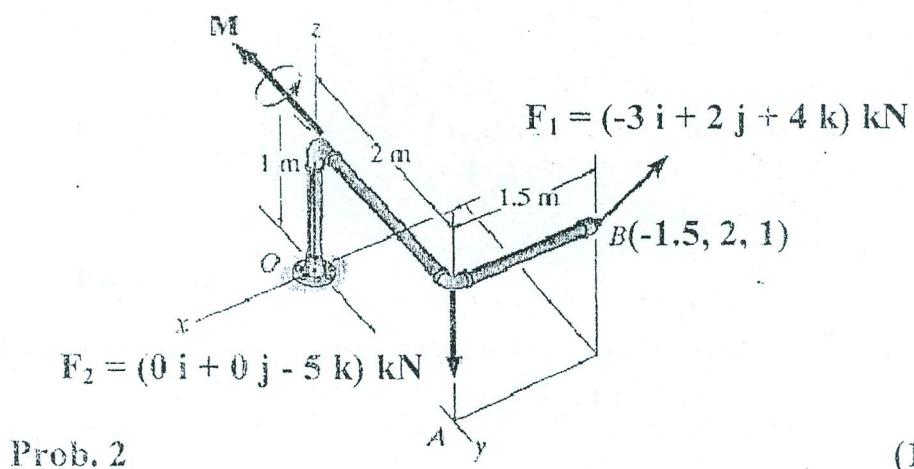


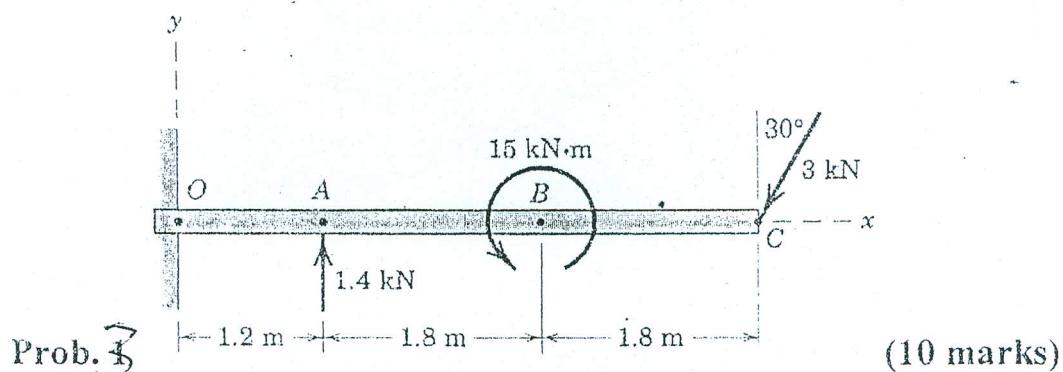
(1-1) Determine the angles  $\theta$  and  $\phi$  for the force  $F = 2 \mathbf{i} + 3 \mathbf{j} + 6 \mathbf{k}$ .

(1-2) (a) Determine the tension in each cord used to support the 1.9 kN crate shown. (b) If the spring constant  $k = 970 \text{ N/m}$ , determine the stretch of the spring for equilibrium.



2- The system shown consists of two forces  $F_1$ ,  $F_2$  and a couple  $M = 4 \mathbf{i} - 3 \mathbf{j} - 3 \mathbf{k}$  kN.m.

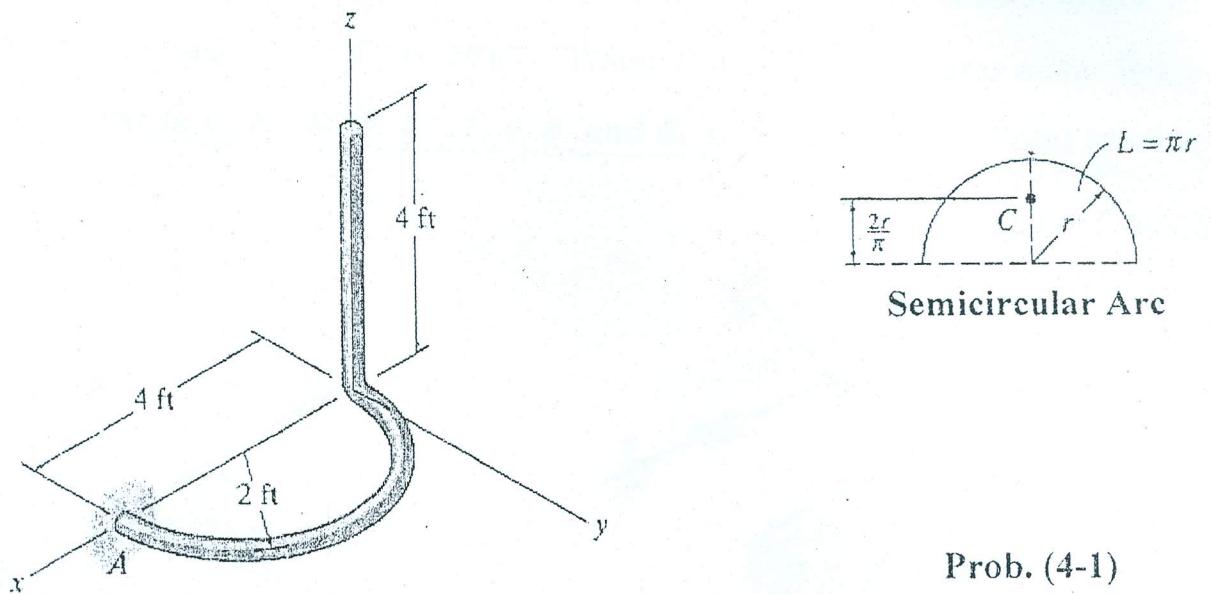
Determine the equivalent force - couple system ( $F_R$  -  $M_R$ ) at point  $O$ .



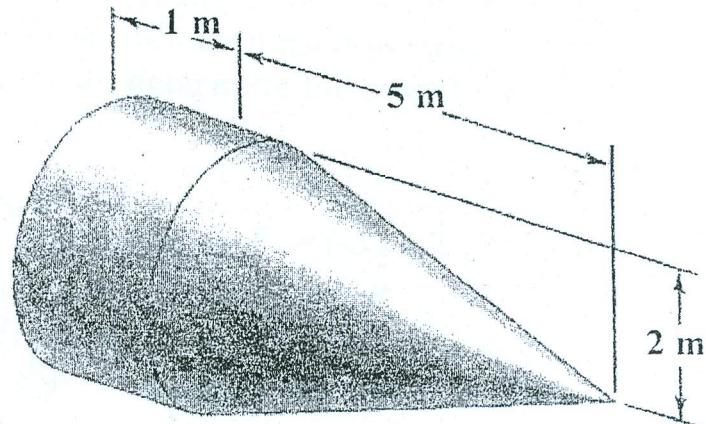
3- Determine the reactions at the fixed support  $O$ .

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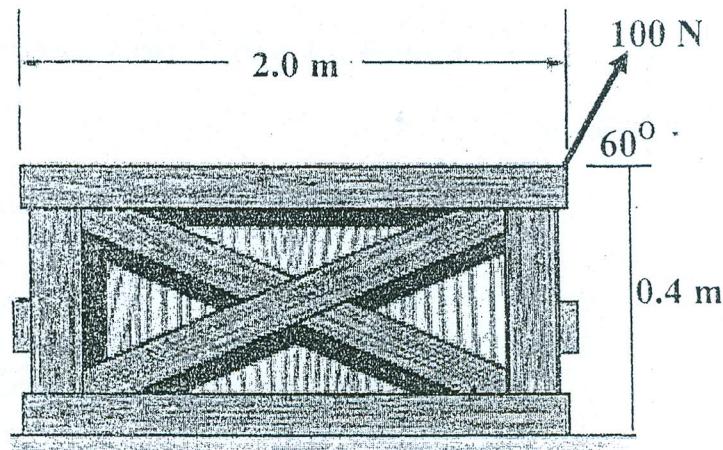


(4-1) Locate the centroid of the homogeneous rod shown. (6 marks)



Prob. (4-2)

(4-2) Using theorems of revolution, determine: (a) the volume and (b) the total surface area of the homogeneous solid body shown. (4 marks)



Prob. 5

(10 marks)

5- The uniform crate shown has a weight of 250 N. The coefficient of static friction is  $\mu_s = 0.25$ . Determine if it remains in equilibrium.

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