每題 20 分

1. Ball B is hanging from an inextensible cord showed in Figure 1. An identical ball A is released from rest when it is just touching the cord and drops through the vertical distance $h_A = 200$ mm before striking ball B. Assuming perfectly elastic impact (e=1) and no friction, determine the resulting maximum vertical displacement h_B of ball B.

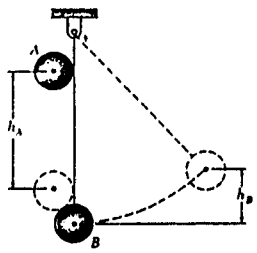

Figure 1

2. Pin P is pushed by arm ABC through the groove, $y = 2(1 - 4x^2)$, where x and y are in feet. The velocity of arm ABC is constant at 10 ft/s to the right. Determine the velocity and acceleration of the collar at the position x = 2 ft.

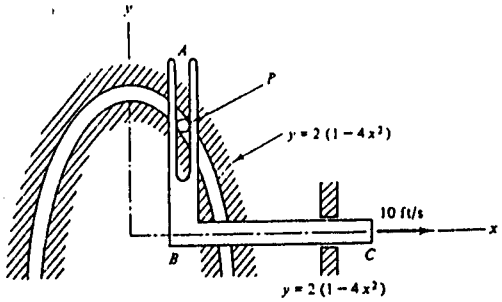

Figure 2

3. A 45-g bullet is fired with a velocity of 650 m/s into a 12-kg wooden plank AB suspended by wires as shown in Figure 3. Determine the velocity of the bullet immediately after it becomes embedded in the plank.

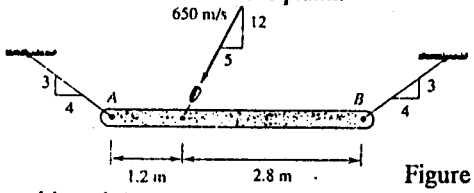

Figure 3

4. A rod of mass m and length L rests on two pulleys A and B which rotate in the direction shown in Figure 4. Denoting by μ_k the coefficient of kinetic friction between the rod and the pulleys, determine the frequency of vibration if the rod is given a small displacement to the right and released.

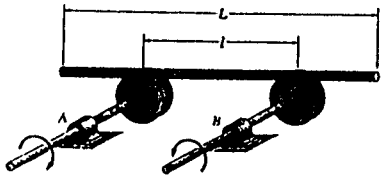

Figure 4

5. The slender bar shown in Figure 5 has a mass m and rests on the smooth floor A and against the smooth wall B. Determine the initial angular acceleration when it is released from rest from the position θ and allowed to slide downward.

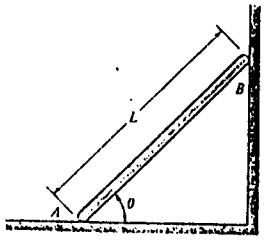

Figure 5