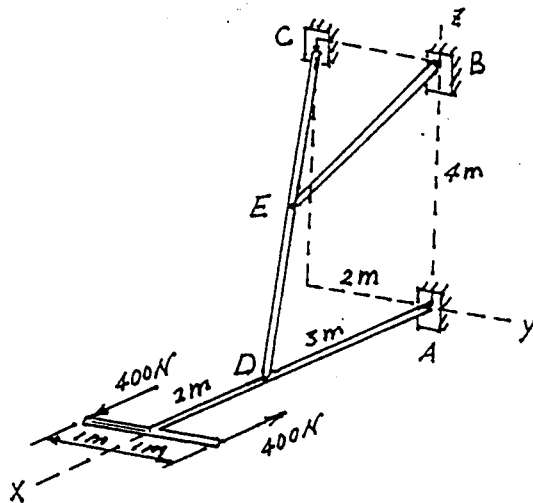# 力 學

1. Determine the force in member EB produced by the action of the applied couple on the space frame. Also compute the components of force acting on CD at D. Point E is midway between C and D, and connections A, B, C, D, and E may be treated as ball-and-socket joints. (25%)

Problem 2 In Fig. 2, XY coordinate is an inertial frame. A man sits inside a vehicle which is travelling with constant angular velocity Ω counterclockwisely in a circle with center O and radius r. However, he does <u>not</u> know that he is moving and he knows nothing but the coordinate xy which is fixed in the vehicle. Let Point P be moving with constant velocity V in the positive X direction. For the position given, what is the velocity and acceleration of Point P from the man's point of view? (25%)
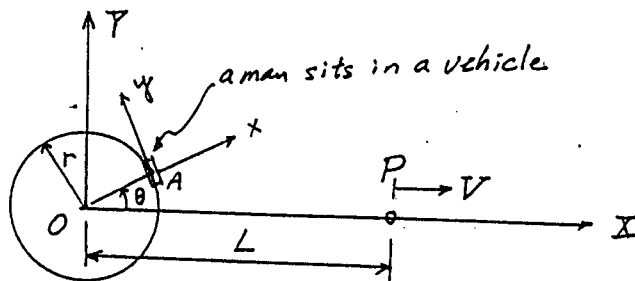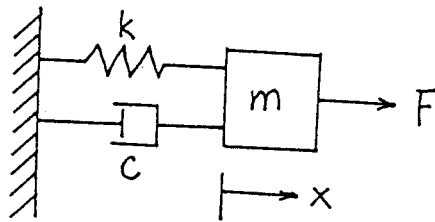

Fig. 2

3. Consider the following system with x being the elongation of spring k.

a. Derive the governing equation of this system.　　(5%)

b. What are the natural frequency and damping ratio of this system? (5%)

c. Suppose F(t) = 0, and x_o, V_o are initial position and velocity of m, respectively. Solve x(t). 　(5%)

d. Suppose the system is subjected to a unit impulse force at t = 1, i.e., $F(t) = \delta(t-1)$, from its rest and unstretched position. Solve x(t).

(Hint: $\int_{0^-}^{0^+} \delta(t)dt = 1$) 　　(10%)

Problem 4　The spring-damper-mass system shown in Fig. 4 is driven with force F.

(a) Derive the equations of motion. (15%)

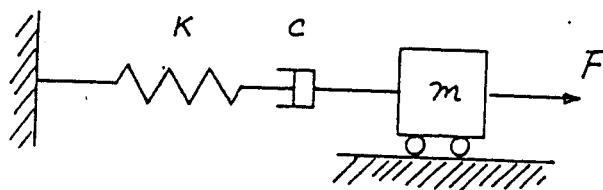(b) If $k \to \infty$, what do the equations of motion become? (10%)

Fig. 4