1. Find the velocity and position as a function of time for a particle moving along the X axis and experiencing a linear retard force $\vec{F} = m\ddot{x} = -k\dot{x}, \dot{x} = \frac{dx}{dt}, \ddot{x} = \frac{d^2x}{dt^2}$

   Initial condition: $v(t=0) = v_0$; $x(t=0) = 0$　25%

2. α粒子的位置向量 $\vec{r} = x\hat{i} + y\hat{j}$ (a)改成以用平面極座標的 $r, \theta, \hat{r}, \hat{\theta}$ 表示 $\vec{r}$ (b)求速度 $\vec{v} = \frac{d\vec{r}}{dt}$ (以r,$\theta,\hat{r},\hat{\theta},\dot{r},\dot{\theta}$表示)

   (c)求 $\vec{a} = \frac{d\vec{v}}{dt}$ (以r,$\theta,\hat{r},\hat{\theta},\dot{r},\dot{\theta},\ddot{r},\ddot{\phi}$表示)(d)解釋你的結果　25%

3. Consider a disc that has a string wrapped around it with one end attached to a fixed support and allows to fall with the string unwinding as it falls (Fig.1). Find (a) Lagrangian (b) the equation of motion of the falling disc. Note: m is the mass of the disc.　25%

4. Find (a) moment of inertia tensor of a homogeneous triangle with density ρ and mass m(Fig.2) (b)the principal moments and principal axes .　25%
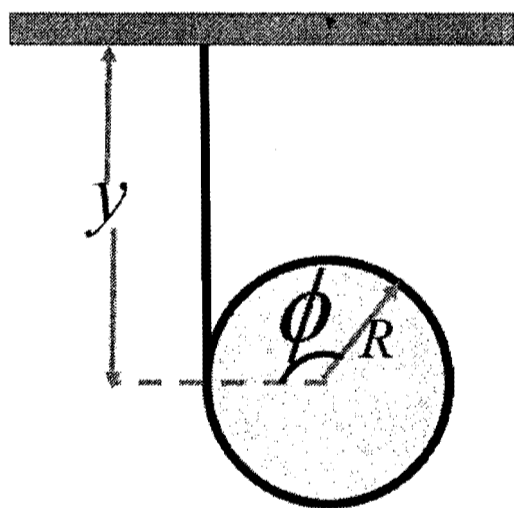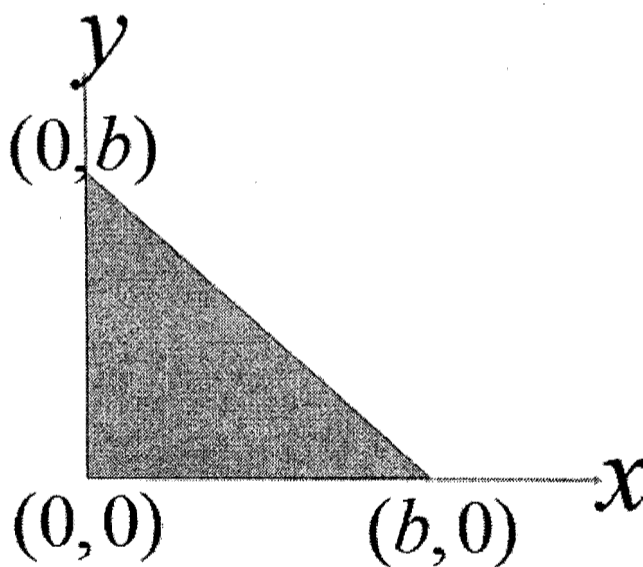

Fig. 1　　　　Fig. 2