1. Find  $\frac{\mathrm{d}w}{\mathrm{d}t}$  at  $t = \pi/4$  if w = xy + yz + zx and  $x = \cos t$ ,  $y = \sin t$  and  $z = \cos 2t$ 

- 2. A cylindrical can of radius r and height h is heated. The radius increases at a rate of 0.0015 cm/min and the height increases at a rate of 0.0025 cm/min.
  - (a) Find the rate of increase of the volume of the can when r=2 cm and h=6 cm.

(b) Find the rate of increase of the surface area of the can when r=2 cm and h=6 cm.

- 3. A charged particle moves along a path given by  $x = 5\cos t 3$  and  $y = 4\sin t$  in the presence of a potential,  $V = -\frac{1}{\sqrt{x^2 + y^2}}$ 
  - (a) Find the rate of change in the potential when  $t = \pi/2$

(b) Find the maximum and minimum value of the potential along the particle path.