Homework Exercise A

1. Find the slope of the curve defined by $\begin{cases} x = \theta - \sin\theta \\ y = 1 - \cos\theta \end{cases}$ at $\theta = \frac{\pi}{2}$	2. Find the arc length of the curve $\begin{cases} x = 6t^2 \\ y = 2t^3 \end{cases}$ on the interval $[1,\ 4]$.
3. Find the area of a surface of revolution of the curve $x = 3\cos\theta, y = 4\sin\theta,$ $0 \leq \theta \leq \frac{\pi}{2}$ about y-axis.	4. Determine the concavity of the curve $x = 3t^2$ and $y = t^3 - t$.
5. Find the tangent line to the curve $r = 2 + 3\sin\theta$, at the point (x, y)=(2, 0).	6. Find the area of one petal of the rose $r = \sin 3\theta$.
7. Find the vector projection of vector **u**=<-9, -2, -4> onto **v**=<0, 4, 4> and also the vector component of **u** orthogonal to **v.**	8. Find the distance from the point Q(1,3,-2) to the line $x = 1 - 3t,\ y = 2 - t,\ z = 3 + 5t$.

9. Find the distance from the point Q(2,8,4) to the plane $2x - y + 3z = 5$	10. Find the distance between two parallel planes 3x-2y+z=6 and 6x-4y+2z=10.
11. Convert the point $(3, \frac{\pi}{4}, 4)$ from cylindrical coordinate(r, θ, z) to rectangular coordinate(x,y,z).	12. Convert the point $(4, \frac{\pi}{6}, \frac{\pi}{4})$ from spherical coordinate(ρ, θ, φ) to rectangular coordinate(x,y,z).
13. Find the area of the parallelogram with **u**=<3, 2, -1> and **v**=<1, 2, 3> as adjacent sides.	14. Find the volume of the parallelepiped with **u**=<1,1,1> **, v**=<2, 1, 0> and **w**=<1, 0, 1> as adjacent edges.