Calculus 0314

Quiz 3.

(1) Find the acute angle (鋭角) between two diagonals of a cube. (9%) $\cos^{-1}\frac{1}{3}$.

(2) Given the points $A(1,\,0,\,1)$, $B(2,\,3,\,0)$, $C(-1,\,1,\,4)$ and $D(0,\,3,\,2)$, find the volume of the parallelepiped with adjacent edges AB, AC, and AD. (9%) 6.

(3) (a) Find a vector perpendicular to the plane through the points $A(1,\,0,\,0)$, $B(2,\,0,\,-1)$ and $C(1,\,4,\,3)$. (4%) $<4,\,-3,\,4>$.

(b) Find the area of triangle ABC. (5%) $\frac{\sqrt{41}}{2}$.

(4) (a) Find the parametric equations for the line. The line through $(-2,\,2,\,4)$ and perpendicular to the plane $2x-y+5z=12$. (4%) $x=2t-2,\ y=-t+2,\ z=5t+4$.

(b) Find the equation of the plane. The plane through $(1,\,2,\,-2)$ that contains the line $x=2t$, $y=3-t$, $z=1+3t$. (5%) $6x+9y-z=26$.

(5) Find the point in which the line with parametric equations $x=2-t$, $y=1+3t$, $z=4t$ intersects the plane $2x-y+z=2$. (8%) $(1,\,4,\,4)$.

(6) An ellipsoid is created by rotating the ellipse $4x^2+y^2=16$ about the x-axis. Find an equation of the ellipsoid. (9%) $4x^2+y^2+z^2=16$.

(7) Change the point $(0,\,-1,\,-1)$ from rectangular to spherical coordinates. (8%) $(\sqrt{2},\,\frac{3}{2}\pi,\,\frac{3}{4}\pi)$.

(8) Match the parametric equations with the graphs (labeled I-VI) in the next page. Give reasons for your choices. (12%)

(a) $x=\cos 4t,\ y=t,\ z=\sin 4t$. VI.

(b) $x=t,\ y=t^2,\ z=e^{-t}$. II.

(c) $x=t,\ y=1/(1+t^2),\ z=t^2$. IV.

(d) $x=e^{-t}\cos 10t,\ y=e^{-t}\sin 10t,\ z=e^{-t}$. I.

(e) $x=\cos t,\ y=\sin t,\ z=\sin 5t$. V.

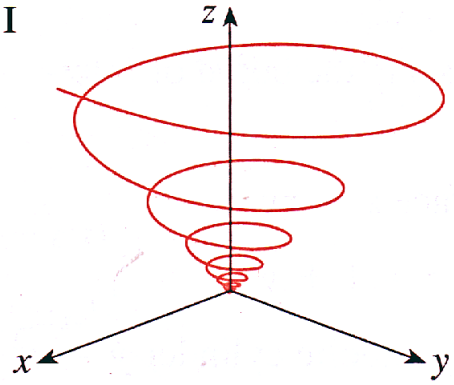
(f) $x=\cos t,\ y=\sin t,\ z=\ln t$. III.

(9) If $\mathbf{r}(t)=<t,\,t^2,\,t^3>$, find $\mathbf{r}'(t)$, $\mathbf{r}''(t)$ and $\mathbf{r}'(t)\times\mathbf{r}''(t)$. (9%) $<1,\,2t,\,3t^2>$, $<0,\,2,\,6t>$, $<6t^2,\,-6t,\,2>$.

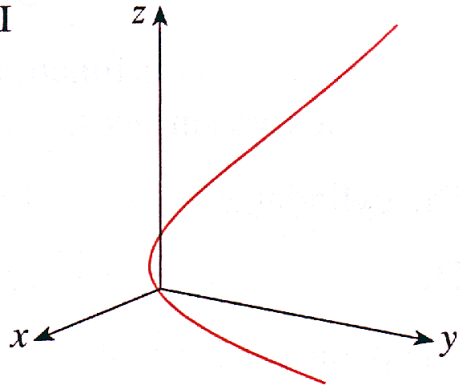
(10) Find the parametric equations for the tangent line to the curve with the given parametric equations at the specified point: $x=t^5$, $y=t^4$, $z=t^3$; $(1,\,1,\,1)$. (9%) $x=5t+1$, $y=4t+1$, $z=3t+1$.

(11) Find the length of the curve: $\mathbf{r}(t)=<2\sin t,\,5t,\,2\cos t>$, $-10\le t\le 10$. (9%) $20\sqrt{29}$.

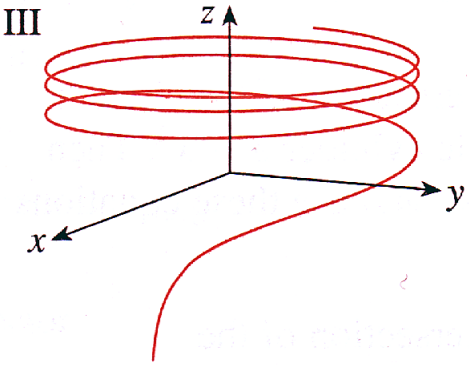
I



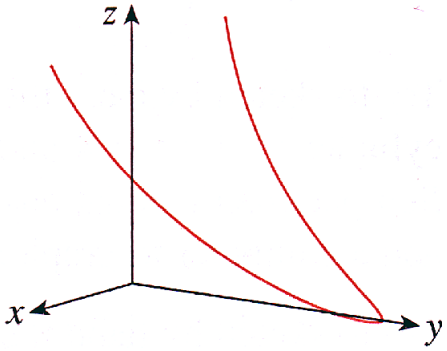
II



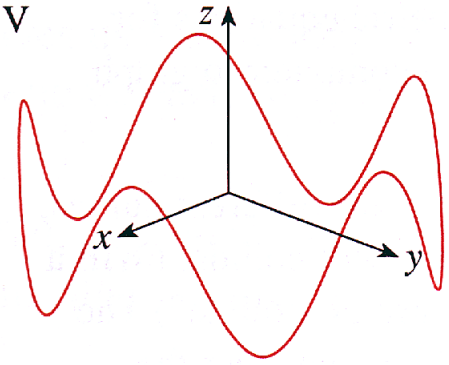
III



IV



V



VI