MA 213 Worksheet #7

Sections 13.1 and 13.2

1 *13.1.3* Find the limit: $\lim_{t\to 0}\left(e^{-3t}\mathbf{i}+\frac{t^2}{\sin^2 t}\mathbf{j}+\cos(2t)\mathbf{k}\right)$.

2 *13.1.17* Find a vector equation and parametric equations for the line segment that joins $P(2,0,0)$ to $Q(6,2,-2)$.

3 *13.1.43* Find a vector function that represents the curve of intersection of the cone $z=\sqrt{x^2+y^2}$ and the plane $z=1+y$.

4 *13.1.49* Suppose the trajectories of two particles are given by the vector functions $\mathbf{r}_1(t)=\langle t^2, 7t-12, t^2\rangle$ and $\mathbf{r}_2(t)=\langle 4t-3, t^2, 5t-6\rangle$ for $t\geq 0$. Do the particles collide?

5 *13.2.9* Find the derivative of the vector function $\mathbf{r}(t)=\langle\sqrt{t-2}, 3, 1/t^2\rangle$.

6 *13.2.23* Find the parametric equation for the tangent line to the curve given by: $x=t^2+1$, $y=4\sqrt{t}$ and $z=e^{t^2-t}$ at the point $(2,4,1)$.

7 *13.2.41* Find $\mathbf{r}(t)$ if $\mathbf{r}'(t)=2t\mathbf{i}+3t^2\mathbf{j}+\sqrt{t}\mathbf{k}$ and $\mathbf{r}(1)=\mathbf{i}+\mathbf{j}$.

Additional Recommended Problems

8 *13.1.7* Sketch the curve $\mathbf{r}(t)=\langle\sin t, t\rangle$. Indicate with an arrow the direction in which t increases.

9 *13.1.31* At what point does the curve $\mathbf{r}(t)=t\mathbf{i}+(2t-t^2)\mathbf{k}$ intersect the paraboloid $z=x^2+y^2$?

10 *13.2.33* The curves $\mathbf{r}_1(t)=\langle t, t^2, t^3\rangle$ and $\mathbf{r}_2(t)=\langle\sin t, \sin(2t), t\rangle$ intersect at the origin. Find their angle of intersection.

11 *13.2.35* Evaluate the integral: $\displaystyle\int_0^2\left(t\mathbf{i}-t^3\mathbf{j}+3t^5\mathbf{k}\right)dt$.

12 *13.2.49* Find $f'(2)$, where $f(t)=\mathbf{u}(t)\cdot\mathbf{v}(t)$, $\mathbf{u}(2)=\langle 1,2,-1\rangle$, $\mathbf{u}'(2)=\langle 3,0,4\rangle$ and $\mathbf{v}(t)=\langle t, t^2, t^3\rangle$.