Math 2401 (K1-K3)
1/21/2015

Quiz 2

(5pts.) **1.** Consider the curve:

$$\vec{r}(t) = 2\cos t\vec{i} + 2\sin t\vec{j} + 2t\vec{k}:$$

a). Find the velocity $\vec{v}(t)$.

b). Find the unit tangent vector $\vec{T}(t)$.

c). Find the arc length parameter s; take $t_0 = 0$ as your base point.

(5pts.) **2.** Find parametric equations for the line tangent to the curve:

$$\vec{r}(t) = (4\cos t)\,\vec{i} + (t^2 - 6\sin t)\,\vec{j} + (e^{4t})\,\vec{k}$$

at the value $t = 0$ of the parameter.

① a). $\vec{v}(t) = \langle -2\sin t, 2\cos t, 2\rangle$ (1pt.)

b). $|\vec{v}(t)| = \sqrt{4\sin^2 t + 4\cos^2 t + 4} = 2\sqrt{2}$ (1pt.)

$\vec{T}(t) = \left\langle -\frac{1}{\sqrt{2}}\sin t, \frac{1}{\sqrt{2}}\cos t, \frac{1}{\sqrt{2}}\right\rangle$ (1pt.)

c). $s(t) = \int_0^t |\vec{v}(\tau)|\,d\tau = \int_0^t (2\sqrt{2})\,d\tau = \boxed{2\sqrt{2}\,t}$ (1pt.)

(1 pt.) for correct formula

② $\vec{v}(t) = \langle -4\sin t, 2t - 6\cos t, 4e^{4t}\rangle$ (1pt.)

$\vec{v}(0) = \langle 0, -6, 4\rangle$ (parallel vector) (1pt.)

$\vec{r}(0) = \langle 4, 0, 1\rangle$ Point: (4,0,1) (1pt.)

Equations: $\boxed{\begin{cases} x = 4 \\ y = -6t \\ z = 1 + 4t \end{cases}}$ (2pts.)