**"QUIZ" for Lecture 4**

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**E-MAILSCANNED .pdf OF COMPLETED QUIZ to DrZcalc3@gmail.com (Attachment: q4FirstLast.pdf) ASAP BUT NO LATER THAN Sept. 17, 8:00pm**

**1.** Find a parametric equation for the tangent line to the curve with the given parametric equation at the specified point

$$x = \cos t \quad , \quad y = \sin t \quad , \quad z = t^2 + 1 \quad ; \quad (1, 0, 1)$$

We find the tangent line by finding the derivative of the equation of the curve (or of its x, y, and z components)

$r'(t) = \langle (\cos t)', (\sin t)', (t^2+1)' \rangle = \langle -\sin t, \cos t, 2t \rangle$

We need to find the t-value where $r(t) = \langle 1, 0, 1 \rangle$:

$\cos t = 1$, $\sin t = 0$, $t^2 + 1 = 1 \rightarrow t = 0$

Find the tangent vector at $t = 0$:

$r'(0) = \langle -\sin 0, \cos 0, 2 \cdot 0 \rangle = \langle 0, 1, 0 \rangle$

The equation for the tangent line is $(1,0,1) + t\langle 0,1,0 \rangle =$

$= \langle 1+0t, 0+1t, 1+0t \rangle = \langle 1, t, 1 \rangle$; or $\boxed{x = 1 \quad y = t \quad z = 1}$

**2.** Find $\mathbf{r}(t)$ if

$$\mathbf{r}'(t) = t\,\mathbf{i} + 2\,\mathbf{j} + (t+1)\,\mathbf{k}$$

and

$$\mathbf{r}(0) = \mathbf{i} + 2\,\mathbf{j} + 3\,\mathbf{k} \quad .$$

To find $r(t)$, we first need to integrate $r'(t)$

$r(t) = \int r'(t)\,dt = \frac{t^2}{2}\vec{i} + 2t\vec{j} + (\frac{t^2}{2} + t)\vec{k} + C$

To find C, use a value we already know:

$r(0) = \frac{0^2}{2}\vec{i} + 2(0)\vec{j} + (\frac{0^2}{2} + 0)\vec{k} + C = C = \vec{i} + 2\vec{j} + 3\vec{k}$

So, $r(t)$ is:

$r(t) = \frac{t^2}{2}\vec{i} + 2t\vec{j} + (\frac{t^2}{2} + t)\vec{k} + \vec{i} + 2\vec{j} + 3\vec{k}$

$\boxed{r(t) = (\frac{t^2}{2} + 1)\vec{i} + (2t+2)\vec{j} + (\frac{t^2}{2} + t + 3)\vec{k}}$