

### Lecture 4 Quiz

1. Find parametric equation for tangent line to the curve:

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

$$1 = \cos t \quad 0 = \sin t \quad 1 = t^2 + 1$$

$$t = 0$$

$$x' = -\sin t \quad y' = \cos t \quad z' = 2t$$

Direction of tangent line:  $\langle 0, 1, 0 \rangle$

Equation of Tangent Line:  $\langle 1, 0, 1 \rangle + t \langle 0, 1, 0 \rangle$

$$\rightarrow \langle 1, 0, 1 \rangle + \langle 0, t, 0 \rangle$$

$$\rightarrow \langle 1, t, 1 \rangle$$

Parametric Equations:

$$x = 1 \quad y = t \quad z = 1$$

2. Find  $r(t)$  if

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

and

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

$$r(t) = \int t\mathbf{i} + 2\mathbf{j} + (t+1)\mathbf{k} \, dt = \left(\frac{t^2}{2}\right)\mathbf{i} + (2t)\mathbf{j} + \left(\frac{t^2}{2} + t\right)\mathbf{k} + C$$

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

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

$$= \left(\frac{t^2}{2} + 1\right)\mathbf{i} + (2t + 2)\mathbf{j} + \left(\frac{t^2}{2} + t + 3\right)\mathbf{k}$$