Lecture 4 Quiz (PDF)

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

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

$\boxed{t = 0}$

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

$r(t) = (-\sin t)\,i + (\cos t)\,j + (2t)\,k$

$r(0) = j$

$\langle 0, 1, 0 \rangle$

$r_2(t) = \langle 1, 0, 1 \rangle + t\langle 0, 1, 0 \rangle$

$r_2(t) = \langle 1, 0, 1 \rangle + \langle 0, t, 0 \rangle$

$r_2(t) = \langle 1, t, 1 \rangle$

$\boxed{x = 1,\ y = t,\ z = 1}$

2. $r'(t) = ti + 2j + (t+1)k$

$r(0) = i + 2j + 3k$

Position @ $t = 0$ is $\langle 1, 2, 3 \rangle$

Velocity @ $t = 0$ is $\langle 0, 2, 1 \rangle$

$\int r'(t) = \int (ti + 2j + (t+1)k)\,dt$

$r(t) = \frac{t^2}{2}i + 2tj + \left(\frac{t^2}{2} + t\right)k + C$

$r(0) = 0 + 0 + 0 + C = i + 2j + 3$

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

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