09/16/2020

Vash Khangura "Quiz" for Lecture 4 Section 2.4

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

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

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

$t = 0$ $\quad t = 0$ $\quad t = 0$

$r(t) = \langle \cos t, \sin t, t^2 + 1 \rangle$

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

$r'(0) = \langle 0, 1, 0 \rangle$

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

Answer: $x(t) = 1 \quad y(t) = t \quad z(t) = t$

2.) Find $r(t)$ if $r'(t) = ti + 2j + (t+1)k$ and $r(0) = i + 2j + 3k$

$$r(t) = \int r'(t)\,dt = \int (ti + 2j + (t+1)k)\,dt = \frac{t^2}{2}i + 2tj + \left(\frac{t^2}{2} + t\right)k + c$$

$$r(0) = \frac{0^2}{2}i + 2 \cdot 0 j + \left(\frac{0^2}{2} + 0\right)k + c = i + 2j + 3k$$

$$c = i + 2j + 3k$$

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

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