

19/ENGG04/024

DIATA ANTHONY ETHINDRAN

Electrical Electronics

1)  $x = t, y = t^2, z = t^3$   
 $r'(t) = i + 2tj + 3t^2k$   
 $r'(1) = i + (2)j + (3)k$   
 $= \langle 1, 2, 3 \rangle$

Finding unit vector

$$\hat{T}(t) = \frac{r'(t)}{|r'(t)|}$$

$$|r'(t)| = \sqrt{1^2 + 2^2 + 3^2}$$

$$= \sqrt{14}$$

$$\therefore \hat{T}(t) = \frac{\langle 1, 2, 3 \rangle}{\sqrt{14}}$$

2)  $A = 4t^3j + 5k$        $B = 2t^2i + 4tj$

$$C = A \times B = \begin{vmatrix} 0 & 4t^3 & 5 \\ 2t^2 & 4 & 0 \end{vmatrix}$$

$$= \begin{vmatrix} \cancel{i} & 0 & 4t^3 \\ \cancel{j} & 2t^2 & 4 \end{vmatrix} - \begin{vmatrix} i & 4t^3 & 5 \\ j & 4 & 0 \end{vmatrix} + \begin{vmatrix} i & 0 & 5 \\ j & 2t^2 & 0 \end{vmatrix} + k \begin{vmatrix} 0 & 4t^3 \\ 2t^2 & 4 \end{vmatrix}$$

$$= 20i - 10t^2j + 8t^5k$$

~~$$\langle 20, -10t^2, 8t^5 \rangle$$~~

$$= \int_0^1 \langle 20, -10t^2, 8t^5 \rangle dt$$

~~$$\int_0^1 (20i - 10t^2j + 8t^5k)$$~~

~~$$= (\int_0^1 20 dt)i + (-\int_0^1 10t^2 dt)j + (\int_0^1 8t^5 dt)k$$~~

$$= \mathbb{R} \left( \int_0^1 20 dt, -\int_0^1 10t^2 dt, \int_0^1 8t^5 dt \right)$$

$$= \langle 20 - 0, -(\frac{10}{3} - 0), 8\frac{8}{6} - 0 \rangle$$

$$= \langle 20, -\frac{10}{3}, \frac{4}{3} \rangle$$