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COMPUTER ENGINEERING

MAT 102 / 11/ENGG02/043

$$y = ti + t^2j + t^3k$$

$$\frac{dy}{dt} = 0 + 2tj + 3t^2k$$

$$\left| \frac{dy}{dt} \right| = i + 2j + 3k$$

(a) $t=1$

$$\sqrt{(1)^2 + (2)^2 + (3)^2}$$

$$= \sqrt{1 + 4 + 9}$$

$$= \sqrt{14}$$

$$T = \frac{i + 2j + 3k}{\sqrt{14}}$$

(b) $A = 0i + 4t^3j + 5k$

$B = 2t^2i + 7tj + 0k$

$$A \times B = \begin{vmatrix} i & j & k \\ 0 & 4t^3 & 5 \\ 2t^2 & 7t & 0 \end{vmatrix}$$

$$\begin{vmatrix} i & j & k \\ 0 & 4t^3 & 5 \\ 2t^2 & 7t & 0 \end{vmatrix} = i(0 \cdot 0 - 5 \cdot 7t) - j(0 \cdot 0 - 10t^2) + k(0 \cdot 28t^2 - 14t)$$

$$= (-35t)i - (-10t^2)j + (-14t)k$$

$$= -35ti + 10t^2j - 14tk$$

$$\int_0^5 (-35ti + 10t^2j - 14tk) dt$$

$$= \left[-\frac{35}{2}t^2i + \frac{10}{3}t^3j - 14tk \right]_0^5$$

$$= -\frac{35}{2}(25)i + \frac{10}{3}(125)j - 14(5)k$$

$$= -437.5i + 416.67j - 70k$$