

Oguntseje Oluwatoyin Oluwatemiola
T9/ENR06/042 Mechanical Engineering

$$1) \vec{B} = (t, t^2, t^3)$$

$$\Rightarrow \frac{d\vec{B}}{dt} \Rightarrow (1, 2t, 3t^2)$$

$$\text{Magnitude} = \sqrt{(1)^2 + (2t)^2 + (3t^2)^2}$$
$$\Rightarrow \sqrt{1 + 4t^2 + 9t^4}$$

$$\Rightarrow \text{unit vector tangent} = \frac{1}{\sqrt{1 + 4t^2 + 9t^4}} (1, 2t, 3t^2)$$

$$2) A = 4t^3 \mathbf{i} + 5t \mathbf{k}, \quad B = 2t^2 \mathbf{i} + 4t \mathbf{j}$$

$$A \times B = \begin{vmatrix} \mathbf{i} & \mathbf{j} & \mathbf{k} \\ 4t^3 & 0 & 5 \\ 2t^2 & 4t & 0 \end{vmatrix} = \mathbf{i}(-20t) - \mathbf{j}(-10t^2) + \mathbf{k}(-8t^3)$$
$$\Rightarrow -20t \mathbf{i} + 10t^2 \mathbf{j} - 8t^3 \mathbf{k}$$

$$G = A \times B$$

$$\text{integral of } G = \int_0^1 (A \times B)$$

$$\Rightarrow \int_0^1 \left(\frac{-20t^2}{2} + \frac{10t^3}{3} - \frac{8t^4}{4} \right) dt$$

$$\Rightarrow -10t^2 + \frac{10t^3}{3} - 2t^4 \Big|_0^1$$

$$\Rightarrow -10 + \frac{10}{3} - 2 \quad \neq -0^\circ$$

$$\Rightarrow \frac{-30}{3} + \frac{10}{3} - \frac{6}{3} \quad \Rightarrow \frac{-26}{3} \circ$$

$$\Rightarrow \log (1.2)^3 + \log \left(\frac{1}{3} \sqrt{10} \right)^2 - \log 0.96$$

$$\Rightarrow 1$$

$$\Rightarrow -10t^2 i + \frac{10t^3}{3} j - 2t^{-4} k - \frac{26}{3} \circ$$