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MAT 102

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①

$$x = t, y = t^2, z = t^3$$

$$t = 1$$

$$x = 1$$

$$y = (1)^2 = 1$$

$$z = 1^3 = 1$$

Unit tangent vector

$$r = \langle 1, 1, 1 \rangle$$

$$\downarrow \frac{v}{|v|} = \frac{\langle 1, 1, 1 \rangle}{\sqrt{1^2 + 1^2 + 1^2}} = \frac{\langle 1, 1, 1 \rangle}{\sqrt{3}}$$

$$= \left\langle \frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}} \right\rangle$$

②

$$A = 4t^3j + 5k$$

$$B = 2t^2i + 4tj$$

$$G = A \times B$$

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

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

$$-20ti + 10t^2j - 8t^3k$$

$$\int_0^1 -20t^1 + 10t^2j - 8t^3k$$

~~$\int -20$~~

$$\left[\frac{-20t^2}{2} + \frac{10t^3}{3} - \frac{8t^4}{4} \right]$$
$$= \left[-10t^2 + \frac{10t^3}{3} - 2t^4 \right]_0^1$$

$$= \left[-10(1)^2 + \frac{10(1)^3}{3} - 2(1)^4 \right] -$$

$$\left[-10(0)^2 + \frac{10(0)^3}{3} - 2(0)^4 \right]$$

$$0 = \left[-10 + \frac{10}{3} - 2 \right]$$

$$0 = \left[-\frac{26}{3} \right]$$

$$\frac{26}{3}$$