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Mat 102

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1) $x = t, y = t^2, z = t^3$ at $t = 1$

$$r = x_i + y_j + z_k$$

$$r = t_i + t^2_j + t^3_k$$

$$\frac{dr}{dt} = i + 2tj + 3t^2k$$

at $t = 1$

$$\frac{dr}{dt} = \sqrt{1^2 + 2^2 + 3^2} = \sqrt{14}$$

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

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

$C = A \times B$

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

$$i(0 - 8t) - j(0 - 10t^2) + k(0 - 8t^5)$$

$$C = -8ti + 10t^2j - 8t^5k$$

$$= \int_0^4 -8t^i + \int_0^4 10t^2j - \int_0^4 8t^5k$$

$$4t^2 i + 5t^2 j - \frac{4}{3}t^3 k$$

at $t=1$

$$4i + 5j - \frac{4}{3}k$$

at $t=0$

$\odot_i \neq \odot_j$ take

upper - lower

$$\int_0^1 \mathbf{v} dt = 4i + 5j - \frac{4}{3}k$$