A DR OYELAMI's Group 19/ENG05/010
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1) $S = x + y + z$

$S = 7t^2 i + (6t^2 - 4t) j + (t - 5) k$

$\frac{ds}{dt} = 14t i + (12t - 4) j + k$

$\therefore$ velocity is $14t i + (12t - 4) j + k$

2)

2) $A = i + 2j - 4k$, $B = 2i - 3j + k$, $C = 4j - 3k$

$A \times (B \times C) = ?$

$$(B \times C) = \begin{vmatrix} i & j & k \\ 2 & -3 & 1 \\ 0 & 4 & -3 \end{vmatrix}$$

$= i(9 - 4) - j(-6) + k(8)$

$= 5i + 6j + 8k$

$$A \times (B \times C) = \begin{vmatrix} i & j & k \\ 1 & 2 & -4 \\ 5 & 6 & 8 \end{vmatrix}$$

$= i(16 + 24) - j(8 + 20) + k(6 - 10)$

$= 40i - 28j - 4k$

$\therefore A \times (B \times C) = 40i - 28j - 4k$

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$R = 4\sin 3t\,i + 4e^{3t}j + 7t^3 k$

$= \int R\,dt$

$= \int (4\sin 3t\,i + 4e^{3t}j + 7t^3 k)\,dt$

$= \int 4\sin 3t\,i\,dt + \int 4e^{3t}j\,dt + \int 7t^3 k\,dt$

$= \left[-\frac{4}{3}\cos 3t\,i + \frac{4}{3}e^{3t}j + \frac{7t^4}{4}k\right] + c$

$= \frac{4}{3}\cos 3t\,i + \frac{4}{3}e^{3t}j + \frac{7t^4}{4}k + c$

$A = 7i + 2j - k,\ B = 2i + j + 4k,\ C = i + j + k$

$A + C = (7i + 2j - k) + (i + j + k)$

$= 8i + 3j$

$B - A = (2i + j + 4k) - (7i + 2j - k)$

$= +\cancel{3}i + j + 4k - 7i - 2j + k$

$= -5i - j + 5k$

$\therefore (A + C)\cdot(B - A) = (8i + 3j)\cdot(-5i - j + 5k)$

$= -40 - 3 + 0$

$= -43$

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(5) $x = t,\ y = t^2,\ z = t^3$

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

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

$$\left.\frac{dr}{dt}\right|_{t=1} = i + 2j + 3k.$$

$$\left|\frac{dr}{dt}_{t=1}\right| = \sqrt{1^2 + 2^2 + 3^2}$$

$$= \sqrt{1 + 4 + 9} = \sqrt{14}$$

$\therefore$ Hence $e_r = \dfrac{i + 2j + 3k}{\sqrt{14}}$

$$e_r = \frac{i + 2j + 3k}{3.74}$$