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DEPARTMENT: COMPUTER SCIENCE

COURSE: MAT 202 ASSIGNMENT (MR OKUNLOLA & DR. OYELAMI'S GROUPS)

MATRIC NO: 19|SCIO1|086

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1)  $A = 5i - 7j - 6k$ ,  $B = j + 4k$ ,  $C = 9i - 4j + k$ . Find  $-8(A+B) \cdot (C-A)$

Soln

$$A+B = (5i - 7j - 6k) + (j + 4k)$$

$$A+B = 5i - 6j - 2k$$

$$-8(A+B) = 8(5i - 6j - 2k)$$

$$= 40i - 48j - 16k$$

$$C-A = (9i - 4j + k) - (5i - 7j - 6k)$$

$$C-A = 4i - 11j - 5k$$

$$-8(A+B) \cdot (C-A) = (40i - 48j - 16k) \cdot (4i - 11j - 5k)$$

$$= 160i + 528j + 80k //$$

2)  $x = -3t$ ,  $y = t^2$ ,  $z = 4t^3$ , where  $t = 1$ .

Soln

$$r = (t^2)i + (4t^3)j +$$

$$r = (-3t)i + (t^2)j + (4t^3)k$$

$$\frac{dr}{dt} = -3i + 2tj + 12t^2k$$

$$\text{at } t = 1, \frac{dr}{dt} = -3i + 2j + 12k$$

$$\left| \frac{dr}{dt} \right|_{t=1} = \sqrt{(-3)^2 + (2)^2 + (12)^2} = \sqrt{9 + 4 + 144} = \sqrt{157} = 12.53$$

$$\text{Hence, } T = \frac{-3i + 2j + 12k}{12.53}$$

3.)  $x = -8t^2$ ,  $y = t^2 - 4t$ ,  $z = t + 1$ , where  $t$  is time. Find its acceleration.

Soln

$$r = (-8t^2)i + (t^2 - 4t)j + (t + 1)k$$

$$\frac{dr}{dt} = (-16t)i + (2t - 4)j + k$$

$$\frac{d^2r}{dt^2} = -16i + 2j$$

∴ The acceleration is  $-16i + 2j$

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

Find  $(A \times B) \times C$

Soln

$$A \times B = \begin{vmatrix} i & j & k \\ 1 & 2 & -4 \\ 2 & -3 & 1 \end{vmatrix}$$

$$= i(2 - 12) - j(1 - (-8)) + k(-3 - 4)$$

$$= -10i - j(1 + 8) - 7k$$

$$= -10i - 9j - 7k$$

$$(A \times B) \times C = \begin{vmatrix} i & j & k \\ -10 & -9 & -7 \\ 0 & 4 & -3 \end{vmatrix}$$

$$\begin{aligned} (A \times B) \times C &= i(27 - (-28)) - j(30 - 0) + k(-40 - 0) \\ &= i(27 + 28) - j(30 - 0) + k(-40 - 0) \\ &= 55i - 30j - 40k // \end{aligned}$$

$$5) R = (4 \sin 3t)i + (4e^{3t})j + (7t^3)k$$

$$\int_0^1 [(4 \sin 3t)i + (4e^{3t})j + (7t^3)k] dt$$

$$= \left( \frac{-4 \sin 3t}{3} \right) i \Big|_0^1 + \left( \frac{4}{3} e^{3t} \right) j \Big|_0^1 + \left( \frac{7t^4}{4} \right) k \Big|_0^1$$

$$= -\frac{4}{3} (\sin 3t) i \Big|_0^1 + \frac{4}{3} (e^{3t}) j \Big|_0^1 + \frac{7}{4} (t^4) k \Big|_0^1$$

$$= \left[ \frac{4}{3} (-\sin 3t i + e^{3t} j) + \frac{7}{4} t^4 k \right] \Big|_0^1$$

$$= -0.07i + 26.8j + 1.75k$$