NAME: FETEPIGI KARINATE BOGOFANYO
MAT. NO: 19/SCI18/004
COLLEGE: SCIENCES
DEPT.: ARCHITECTURE

MAT 102

1. Let $P(x, y, z)$ be any point on the given curve and $\vec{r} = x\hat{i} + y\hat{j} + z\hat{k}$ be the position vector of P relative to O as origin.
Then $\frac{dx}{dt}\hat{i} + \frac{dy}{dt}\hat{j} + \frac{dz}{dt}k = \frac{d\vec{r}}{dt} =$

Velocity vector $\vec{v} = \frac{d\vec{r}}{dt} = 14t\hat{i} + 12t - 4j + t - 5$

2. $\begin{vmatrix} i & j & k \\ 2 & -3 & 1 \\ 0 & 4 & -3 \end{vmatrix} = \begin{vmatrix} -3 & 1 \\ 4 & -3 \end{vmatrix} i + \begin{vmatrix} 2 & 1 \\ 0 & 3 \end{vmatrix} j + \begin{vmatrix} 2 & -3 \\ 0 & 4 \end{vmatrix} k$

$= (9-4)i + (6-0)j + (8-0)k$

$\therefore B \times C = 5i + 6j + 8k$

let $B \times C = D$

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

NEXT PAGE →

$$\begin{vmatrix} i & j & k \\ 1 & 2 & -4 \\ 5 & 6 & 8 \end{vmatrix} = \begin{vmatrix} 2 & -4 \\ 6 & 8 \end{vmatrix} i + \begin{vmatrix} 1 & -4 \\ 5 & 8 \end{vmatrix} j + \begin{vmatrix} 1 & 2 \\ 5 & 6 \end{vmatrix} k$$

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

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

3. $\int R\,dt = \langle \int (4\sin 3)\,dt, \int (4e^{3t})\,dt, 7\,dt \rangle$

$\cancel{\int R\,dt = 4x\sin 3t\,i + 4e^{3t}x + C + 7t^3 +}$ $+C$

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

$4(A+C) = 6i + j + 0k$

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

$(6i+j) \cdot (-5i - j + 5k)$

$= 6i \times 5i + -j$

$= -30i - j$

5 Tangent vector

$dx/dt = 1$, $dy/dt = 2t$, $dz/dt = 3t^2$

where $t = 1$ $= \langle 1, 2, 3 \rangle$

unit tangent vector $= v/|v|$

$|v| = \sqrt{(1)^2 + (2)^2 + (3)^2} = \sqrt{14} = 3.7$

$$\frac{v}{|v|} = \frac{\langle 1, 2, 3 \rangle}{\sqrt{14}}$$

$$= \left\langle \frac{1}{\sqrt{14}}, \frac{2}{\sqrt{14}}, \frac{3}{\sqrt{14}} \right\rangle$$