SN: 206

Name: Ndubuisi Marvellous Chibueze
Department: ~~19/ENG04/032~~ Electrical/Electronics Engineering
Matric No: 19/ENG04/032

1a) $x = t$

$y = t^2$

$z = t^3$

$n = ti + tj + t^3k$

$\frac{dn}{dt} = i + 2ty + 3t^2k$

When $t = 1$

$\left|\frac{dn}{dt}\right| = i + 2y + 3k$

$\left|\frac{dn}{dt}\right| = \sqrt{(1)^2 + (2)^2 + (3)^2}$

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

$= \sqrt{14} = 3.74$

$T = \frac{da/dt}{|dn/dt|}$

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

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

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

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

$G = A \times B$

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

$$G = i\begin{vmatrix} 4t^3 & 5 \\ 4t & 0 \end{vmatrix} - j\begin{vmatrix} 0 & 5 \\ 2t^2 & 6 \end{vmatrix} + k\begin{vmatrix} 0 & 4t^3 \\ 2t^2 & 4t \end{vmatrix}$$

$$G = i(0 - 20t) - j(0 - 10t^2) + k(0 - 8t^5)$$

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

$$\int G = \int -20ti + 10t^2 j - 8t^5 k \, dt$$

$$= \left[\frac{-20ti^2}{2} + \frac{10t^3 j}{3} - \frac{8t^6 k}{6}\right]$$

$$= \left[-10t^2 i + \frac{10t^3 j}{3} - \frac{4t^6 k}{3}\right]$$

$$= \left[-10(1)^2 i + \frac{10(1)^3 j}{3} - \frac{4(1)^6 k}{3}\right]^0 - [0]$$

$$= 10i + \frac{10j}{3} - \frac{4k}{3}$$

$$= -10i + 3.33j - 1.33k$$