Name: Nwaiaka Onyedikachi R. Matric No: 19/ENG01/015

Department: Chemical Engineering Serial No: 17

Math 102 Assignment

1.) $x = t \quad y = t^2 \quad z = t^3 \quad t = 1$

$$T = \frac{dr/dt}{|dr/dt|}$$

$r = xi + yj + zk$

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

$dr/dt = i + 2tj + 3t^2k$

$\Rightarrow dr/dt$ at $t = 1 \quad j \quad i + 2j + 3k$

$|dr/dt| = \sqrt{(1)^2 + (2)^2 + (3)^2} = \sqrt{1 + 4 + 9} = \sqrt{14}$

$\therefore T = \frac{i + 2j + 3k}{\sqrt{14}}$

2.) $A = 4t^3j + 5k \qquad B = 2t^2 i + 4tj$

$G = A \times B =$

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

$G = -20ti + 10t^2j - 8t^5k$

$$\int_0^1 G = \int_0^1 -20ti + 10t^2j - 8t^5k$$

$$= \left[\frac{-20t^2}{2} i + \frac{10t^3}{3} j - \frac{8t^6}{6} k \right]_0^1$$

$$\left[\frac{-20(1)^2}{2} i + \frac{10(1)^3}{3} j - \frac{8(1)^6}{6} k \right] - \left[\frac{-20(0)^2}{2} i + \frac{10(0)^3}{3} j - \frac{8(0)^6}{6} k \right]$$

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