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 Matric No: 19 ENGOB/043  
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 Course: MAT102  
 Assignment

1)  $x = t$

$y = t^2$

$z = t^3$

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

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

when  $t = 1$

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

$|\frac{dr}{dt}| = \sqrt{1^2 + 2^2 + 3^2}$

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

$= \sqrt{14}$

$= 3.87$

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

$= \frac{i + 2j + 3k}{3.87}$

$= \frac{i}{3.87} + \frac{2j}{3.87} + \frac{3k}{3.87}$

2)  $A = 4t^3i + 5k$

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

$G = A \times B$

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

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

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

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

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

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

$$= \left[ -10t^2i + \frac{10t^3}{3}j - \frac{4t^6}{3}k \right]_0^1$$

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

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

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