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Computer Engineering 19/ENGO2/061

MAT 102 Assignment

$$1) x = b, y = b^2, z = b^3$$

$$r = b^0 i + b^2 j + b^3 k$$

$$\frac{dr}{dt} = 0 + 2b j + 3b^2 k$$

$$\text{at } b = 1$$

$$= 0 + 2j + 3k$$

$$\left| \frac{dr}{dt} \right| = \sqrt{0^2 + 2^2 + 3^2} = \sqrt{13}$$

$$T = \frac{dr/dt}{|dr/dt|} = \frac{0 + 2j + 3k}{\sqrt{13}}$$

$$2) A = 4b^3 i + 5k, B = 2b^2 j + 4b j$$

$$G = A \times B = \begin{vmatrix} i & j & k \\ 0 & 4b^3 & 5 \\ 2b^2 & 4b & 0 \end{vmatrix}$$

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

$$i(-20b) - j(-10b^2) + k(-8b^5)$$

$$-20bc + 10b^2 j - 8b^5 k$$

$$V = \int_0^1 -20bt^2 + 10bt^3 - 8bt^5 k$$

$$\left[ \frac{-20bt^3}{3} + \frac{10bt^4}{4} - \frac{8bt^6}{6} k \right]_0^1$$

$$\left[ \frac{-10bt^3}{3} + \frac{10bt^4}{4} - \frac{4bt^6}{3} k \right]_0^1$$

$$\left( \frac{-10(1)^3}{3} + \frac{10(1)^4}{4} - \frac{4(1)^6}{3} k \right) - \left( \frac{-10(0)^3}{3} + \frac{10(0)^4}{4} - \frac{4(0)^6}{3} k \right)$$

$$\left( \frac{-10}{3} + \frac{10}{4} - \frac{4}{3} k \right) - 0$$

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