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Electrical Electronics Engineering
Maths 102

1) $r = xi + yj + zk$

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

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

$$At t=1 \quad \frac{dr}{dt} = i + 2j + 3k$$

$$\left| \frac{dr}{dt} \right| = \sqrt{(1)^2 + (2)^2 + (3)^2} = \sqrt{14}$$

$$T = \frac{dr/dt}{\left| \frac{dr}{dt} \right|} = \frac{i + 2j + 3k}{\sqrt{14}}$$

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

$$G = A \times B = (4t^3j + 5k) \times (2t^2i + 4tj)$$

$$G = 16t^4$$

$$= \int_2^1 16t^4 dt$$

$$\int_0^1 \frac{16t^5}{5} + C$$

$$= \frac{16}{5}$$

$$5$$