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

$r = xi + yj + zk$

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

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

$|dr/dt| = \sqrt{(dx/dt)^2 + (dy/dt)^2 + (dz/dt)^2} = \sqrt{(1)^2 + (2)^2 + (3)^2}$

$\therefore T(t) = \frac{(dr/dt)}{|dr/dt|} = \frac{i + 2tj + 3t^2 k}{\sqrt{14}}$

$\therefore$ Unit tangent at $t = 1$, $T_{(1)} = \frac{1 + 2(1)j + 3(1)^2 k}{\sqrt{14}}$

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

2) $\bar{A} = 4t^3 j + 5k \quad \bar{B} = 2t^2 i + 4t$

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

$\therefore G = i(0-20) - j(0-10) + k(0-8)$

$G = -20i + 10j - 8k$

$\therefore \int G(t)dt = -20ti + 10tj - 3tk + c$

$\int_0^1 G(t)dt = \left[-20t + 10t - 3t\right]_0^1$

$= [-20(1) + 10(1) - 3(1)] - 0$

$= -13 - 0$

$= -13$ sq units