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

$r = xi + yj + zk$

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

$\frac{dr}{dt} = 1i + 2tj + 3t^2k$

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

$\left|\frac{dr}{dt}\right| = \sqrt{\left(\frac{dx}{dt}\right)^2 + \left(\frac{dy}{dt}\right)^2 \left(\frac{dz}{dt}\right)^2}$

$= \sqrt{(1)^2 + (2)^2 + (3)^2} = \sqrt{14}$

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

Unit tanget at $t = 1$,

$T(1) = \frac{i + 2(1)j + 3(1)^2k}{\sqrt{14}}$

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

2) $A = 4i + 3j + 5k$ 8

$B = 2i + j + 4t$

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

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

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

$\therefore \int F(t)\,dt = -20ti + 10tj$
$-3tk + C$

$\int_0^1 (F(t))\,dt = \int -20t + 10t -3$

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

$= -13 - 0$

$= -13$ square units