

1. $y = ti + t^2j + t^3k$
 $\frac{dy}{dt} = i + 2tj + 3t^2k.$

$\frac{dy}{dt} = i + 2j + 3k$
 $\sqrt{(1)^2 + (2)^2 + (3)^2}$
 $= \sqrt{1+4+9} = \sqrt{14}$
 $T = \frac{i + 2j + 3k}{\sqrt{14}}$

2. $A = 0i + 4t^3j + 5k$
 $B = 2t^2i + 4tj + 0k$

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

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

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

$\int_0^1 (-20ti + 10t^2j - 8t^5k)$

$= \left[-20(1)i + 10(1)^2j - 8(1)^5k \right] -$

$\left[-20(0)i + 10(0)^2j - 8(0)^5k \right]$

$= \left[-20i + 10j - 8k \right] - \left[0 \right]$

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