

Henshaw David G.
Civil Engineering
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MAT 102 Assignment

① $r = xi + yj + zk$

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

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

$$\left| \frac{dr}{dt} \right| = \sqrt{(1)^2 + (2t)^2 + (3t^2)^2}$$
$$= \sqrt{1 + 4t^2 + 9t^4}$$

at $t = 1$

$$\left| \frac{dr}{dt} \right| = \sqrt{1 + 4 + 9} = \sqrt{14}$$

$$\frac{\vec{r}}{|r|} = \frac{1}{\sqrt{14}} (ti + t^2j + t^3k)$$

at $t = 1$

$$\frac{1}{\sqrt{14}}, \frac{1}{\sqrt{14}}, \frac{1}{\sqrt{14}}$$

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

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

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

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

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

$$\frac{1}{0} \left(\frac{-20t^2}{2} \right) i + \left(\frac{10t^3}{3} \right) j + \left(\frac{8t^6}{6} \right) k$$

$$= \frac{-20}{2} i + \frac{10}{3} j + \frac{8}{6} k$$

$$= (-10) i + (3.3) j + (1.3) k$$