

$$2. A = i + 2j - 4k$$

$$B = 2i - 3j + k$$

$$C = 4j - 3k$$

$$A \times (B \times C)$$

$$i + 2j - 4k \times [(2i - 3j + k) \times (4j - 3k)]$$

$$i + 2j - 4k \times [-12j - 3k]$$

$$-24j + 12k //$$

$$3. R = 4 \sin 3t i + 4e^{3t} j + 7t^3 k$$

$$\int R dt = -\frac{4}{3} \cos 3t i + \frac{4e^{3t}}{3} j + \frac{7t^4}{4} k$$

$$1. A = 7i + 2j - k$$

$$B = 2i + j + 4k$$

$$C = i + j + k$$

$$(A+C) \cdot (B-A)$$

$$(A+C) = 7i + 2j - k + i + j + k$$

$$= (8i + 3j)$$

$$(B-A) = 2i + j + 4k - 7i - 2j - k$$

$$= (-5i - j - 5k)$$

$$(A+C) \cdot (B-A) = (8i + 3j) \cdot (-5i - j - 5k)$$

$$= -40i - 3j //$$

$$5. \quad x = t \quad y = t^2 \quad z = t^3$$

$$r = x\hat{i} + y\hat{j} + z\hat{k}$$

$$r = t\hat{i} + t^2\hat{j} + t^3\hat{k}$$

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

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

$$\frac{dr}{dt} = \hat{i} + 2\hat{j} + 3\hat{k}$$

$$|\frac{dr}{dt}| = \sqrt{1^2 + 2^2 + 3^2}$$

$$= \sqrt{1+4+9} = \sqrt{14}$$

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

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1. A particle moves along a curve, $x = 7t^2$, $y = 6t^2 - 4t$, $z = t - 5$
where t is time, find its velocity

Soln

We know velocity = $\frac{d\vec{r}}{dt}$

Since we are dealing with position vectors

let $P(x, y, z)$ be any point on the given curve

and $\vec{r} = x\hat{i} + y\hat{j} + z\hat{k}$ be the position vector of P relative to O
as the origin

Substituting x, y, z in \vec{r}

$$\text{we have } \vec{r} = (7t^2)\hat{i} + (6t^2 - 4t)\hat{j} + (t - 5)\hat{k}$$

So velocity vector \vec{v}

will be the differential of \vec{r} in
respect to t

Differentiating

$$\text{vector } \vec{v} = \frac{d\vec{r}}{dt} = \frac{d}{dt} [7t^2\hat{i} + (6t^2 - 4t)\hat{j} + (t - 5)\hat{k}]$$

$$\vec{v} = \frac{d\vec{r}}{dt} = 14t\hat{i} + (12t - 4)\hat{j} + \hat{k}$$