

BILIAMEN ADEDOLAPO ABDULFATIM

19/ENGO5/019

MAROKUNLOLA

1  $x = t^2, y = 5t^2 + t, z = t + 7$

Solution

$$r = xi + yj + zk$$

$$\therefore r = t^2i + (5t^2 + t)j + (t + 7)k$$

$$\frac{dr}{dt} = 2ti + (10t + 1)j + k \quad \text{velocity}$$

$$\frac{d^2r}{dt^2} = 2i + 10j \quad \text{Acceleration}$$

$$\text{Acceleration} = \frac{d^2r}{dt^2} = 2i + 10j$$

2  $P = i - 9j - 4k, Q = 8i - 3j + 6k, R = i + 4j - 3k$

Find  $(P \times Q) \cdot (R \times B)$

Solution

$$(P \times Q) = \begin{vmatrix} i & j & k \\ 1 & -9 & -4 \\ 8 & -3 & 6 \end{vmatrix}$$

$$i(-54 - 12) - j[6 - (-32)] + k[-3 - (-72)]$$

$$i(-66) - j(6 + 32) + k(-3 + 72)$$

$$i(-66) - j(38) + k(69)$$

$$(P \times Q) = -66i - 38j + 69k$$

$$(R \times P) = \begin{matrix} i & j & k \\ 1 & -4 & -3 \\ 1 & -9 & -4 \end{matrix}$$

$$i[16 - 27] - j[-4 - (-3)] + k[-9 - (-4)]$$

$$i(-11) - j(-1) + k(-5)$$

$$-11i + j - 5k$$

$$(R \times P) = -11i + j - 5k$$

$$(P \times Q) \cdot (R \times P) = (-66i - 38j + 69k) \cdot (-11i + j - 5k)$$

$$(P \times Q) \cdot (R \times P) = 726 - 38 - 345$$

$$726 - 383$$

$$(P \times Q) \cdot (R \times P) = 343$$

$$3 \quad F = 5 \cos 7t i - 2e^{3t} j - 4t^3 k$$

$$\int f dt = \left[ (5 \cos 7t) i - (2e^{3t}) j - (4t^3) k \right] dt$$

$$\int f dt = (5 \cos 7t) i dt - (2e^{3t}) j dt - (4t^3) k dt$$

$$\int f dt = \left( \frac{5 \times 1}{7} \sin 7t \right) i - \left( \frac{2 \times 1}{3} e^{3t} \right) j - \left( \frac{4t^4}{4} \right) k$$

$$\int f dt = \frac{5}{7} \sin 7t i - \frac{2}{3} e^{3t} j - t^4 k + C$$