Mat 102

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(1) $r = ax_i + ay_j + az_j$

$r = t^2_i + (-5t^2 + t)_j + (t+7)_k$

velocity $= \frac{dr}{dt}$

$\frac{dr}{dt} = 2t_i + (-10t + 1)_j + (1 + 0)k$

~~$= 2t + (-10t) + 1 + 1$~~

~~$= 2t - 10t + 2$~~

acceleration $= d^2r/dt^2$

$\frac{d^2r}{dt^2} = 2_i - 10_j + 0k$

$\frac{d^2r}{dt^2} = 2i - 10_j$

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

find $(P \times Q) \cdot (R \times P)$

Solution

$(P \times Q) = \begin{vmatrix} i & j & k \\ 1 & -9 & -4 \\ 8 & -3 & 6 \end{vmatrix} = i(-54 + 12) - j(6 + 32) + k(-3 +$

$i(-42) - j(38) + k(69)$

$-42i - 38_j + 69k$

$(P \times Q) = -42_i - 38_j + 69k$

$$(R \times P) = \begin{vmatrix} i & j & k \\ 1 & -4 & -3 \\ 1 & -3 & -4 \end{vmatrix} = i(16-27) - j(-4+3) + k(-9+4)$$

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

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

$$(Q \times Q) \cdot (R \times P) = (-42i - 38j + 69k) \cdot (-11i + j - 5k)$$

$$= 462 - 38 - 345$$

$$= 79$$

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

Soln

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

$$= 5\int \cos 7t\, i - 2\int e^{3t} \frac{-4}{4} t^4 k$$

$$= \frac{5}{7}\sin 7t\, i \quad \frac{-2}{3}e^{3t} - t^4$$