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COURSE CODE: MAT 102

$$\textcircled{1} \quad x = t^2, \quad y = -5t^2 + t, \quad z = t + 7$$

$$\frac{dx}{dt} = 2t, \quad \frac{dy}{dt} = -10t + 1, \quad \frac{dz}{dt} = 1$$

$$\frac{d^2x}{dt^2} = 2, \quad \frac{d^2y}{dt^2} = -10, \quad \frac{d^2z}{dt^2} = 0$$

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

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

$$= i(-54 - 12) - j(6 - (-32)) + k(-3 - (-72)) \\ = -66i - 38j - 69k$$

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

$$= i(-16 - 27) - j(-4 - (-3)) + k(-9 - (-4)) \\ = -11i + j - 5k$$

$$(P \times Q) \cdot (R \times P) = (-66i - 38j - 69k) \cdot (-11i + j - 5k) \\ = 726 - 38 + 345$$

$$(P \times Q) \cdot (R \times P) = 1033$$

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

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

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

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