

NAME: OKWUOKWU BRYAN COURSE: MAT 102

MATRIC No.: 19/ENG05/049 DEPARTMENT: MECHATRONICS

① $S = x + y + z$

$$S = t^2 + (-5t^2 + t) + (t + 7)$$

$$\text{Velocity} = \frac{dS}{dt} = 2t + (-10t + 1) + 1$$

$$\text{acceleration} = \frac{d^2S}{dt^2} = 2 + (-10) + 1 = -7 \text{ m/s}^2$$

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

$$R = i - 4j - 3k$$

$$P \times Q = \begin{vmatrix} i & j & k \\ 1 & -9 & -4 \\ 8 & -3 & 6 \end{vmatrix} = i(-54 - 12) - j(6 + 32) + k(-3 + 72)$$
$$= -66i - 38j + 69k$$

$$R \times P = \begin{vmatrix} i & j & k \\ 1 & -4 & -3 \\ 1 & -9 & -4 \end{vmatrix} = i(16 - 27) - j(-4 + 12) + k(-9 + 4)$$
$$= -11i + 8j - 5k$$

$$(P \times Q) \cdot (R \times P) = 726 + (-38) + 345 = 1033$$

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

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