Name: Sedi ughoso fortune.
Matric NO: 19/SC101/083
Department: Computer-Science.

1) $M = pi - 6j - 3k$

$N = 4i + 3j - k$

$O = i - 3j + 2k$

a) M and N are perpendicular to each other.

$(M \cdot N) = (pi - 6j - 3k) \cdot (4i + 3j - k)$

$4p - 18 + 3$

$4p - 15$

Since they are perpendicular.

$4p - 15 = 0$

$\frac{\cancel{4}p}{\cancel{4}} = \frac{15}{4}$

$p = 3.75$

b) M, N, and O are -

$$M \cdot (N \times O) = \begin{vmatrix} p & -6 & -3 \\ 4 & 3 & -1 \\ 1 & -3 & 2 \end{vmatrix}$$

$$p\begin{vmatrix} 3 & -1 \\ -3 & 2 \end{vmatrix} - 6\begin{vmatrix} 4 & -1 \\ 1 & 2 \end{vmatrix} - 3\begin{vmatrix} 4 & 3 \\ 1 & -3 \end{vmatrix}$$

$p(3 \times 2) - (-1 \times -3) - 6(4 \times 2) - (-1 \times 1) - 3(4 \times -3) - (3 \times 1)$

$p(6 - (+3)) - 6(8 + 1) - 3(-12) - (3)$

$p(3) + 54 + 45 = 0$

$\frac{3p}{\cancel{3}} = \frac{-99}{3}$

$p = -33$

(2).

Sum of $(3i + 2j + 5k) + (2i - j + 6k) + (5i + 2j - 3k)$.

$11i + 3j - 8k$.

direction of cosine.

$a_x = 11 \quad a_y = 3 \quad a_z = -8$

$|R| = \sqrt{(11)^2 + (3)^2 + (-8)^2}$

$\sqrt{121 + 9 + 64}$

$\sqrt{194}$

$= 13.92$

$\cos\alpha = \frac{a_x}{|r|} = \frac{11}{13.92}$

$\cos\beta = \frac{a_y}{|r|} = \frac{3}{13.92}$

$\cos\gamma = \frac{a_z}{|r|} = \frac{-8}{13.92}$

~~R = 11i + 3j - 8k~~. $A = 11i + 3j - 8k$

$e_A = \frac{\bar{A}}{|A|} =$

$|A| = \sqrt{11^2 + 3^2 + (-8)^2}$

$= \sqrt{194} = 13.92$.

$e_A = \frac{11i + 3j - 8k}{13.92}$ or $\frac{11i}{13.92} + \frac{3j}{13.92} - \frac{8}{13.92}k$

If $F = 3ui + u^2 j + (u+2)k$ and $V = 2ui - 3uj + (u-2)k$
Evaluate the integral of $(F \times V)\,du$ from 0 to 1

Solution:

$\int (F \times V)\,du$

$$F \times V = \begin{vmatrix} i & j & k \\ 3u & u^2 & u+2 \\ 2u & -3u & u-2 \end{vmatrix}$$

$= i[(u^2 \times u-2) - (u+2 \times -3u)] - j[(3u \times u-2) - (u+2 \times 2u)]$
$+ k[(3u \times -3u) - (u^2 \times 2u)]$

$= [(u^3 - 2u^2) - (-3u^2 - 6u)]i - [(3u^2 - 6u) - (2u^2 + 4u)]j$
$+ [(-9u^2 - 2u^3]k$

$= [u^3 - 2u^2 + 3u^2 + 6u]i - [3u^2 - 6u - 2u^2 - 4u]j$
$+ [-9u^2 - 2u^3]k$

$= [u^3 + u^2 + 6u]i - [u^2 - 10u]j + [-9u^2 - 2u^3]k$

$= \left[(u^3 + u^2 + 6u)i + (-u^2 + 10u)j + (-9u^2 - 2u^3)k\right]_1^0$

$= [(0^3 + 0^2 + 6(0))i + (-0^2 + 10(0))j + (-9(0)^2 - 2(0)^3)k]$
$- [(1^3 + 1^2 + 6(1))i + (-1^2 + 10(1))j + (-9(1)^2 - 2(1)^3)k]$

$= [0 + 0 + 0] - [(1+1+6)i + (-1+10)j + (-9-2)k]$

$= 0 - [8i + 9j - 11k]$

$= -8i - 9j + 11k$