a. $\bar{V} = (3i + 2j + 5k) + (2i - j + 6k) + (5i + 2j - 3k)$

$V = 10i + 3j + 8k$

$a_x = 10$, $a_y = 3$ and $a_z = 8$

$|V| = \sqrt{10^2 + 3^2 + 8^2}$

$= \sqrt{100 + 9 + 64}$

$= \sqrt{173} = 13.15$

the direction cosines

$\cos\alpha = \frac{a_x}{|V|} = \frac{10}{13.15} = 0.761$

$\cos\beta = \frac{a_y}{V} = \frac{3}{13.15} = 0.228$

$\cos\gamma = \frac{a_z}{|V|} = \frac{8}{13.15} = 0.608$

b) unit vector

$e_V = \frac{V}{|V|} = \frac{(10i + 3j + 8k)}{13.15}$

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$m = 8i - 6j$ ...

$M = 4i + 3j$ ...

$0 = i - 3$ ...

@ Mand...
M...

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$m = pi - 6j - 3k$
$n = 4i + 3j - k$
$o = i - 3j + 2k$

(a) M and N are perpendicular to each other

$M.N = (pi - 6j - 3k).(4i + 3j - k)$
$= 4p - 15$

Since they are perpendicular

$4p - 15 = 0$

$4p/4 = 15/4$

$p = 15/4$

(b) M, N and O are perpendicular

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

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

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

$= 3p + 6(9) - 3(-15) = 0$

$3p + 54 + 45 = 0$

$= 3p + 99 = 0$

$3p/3 = -99/3$ $p = -33$