1. If $\vec{a}, \vec{b} and \vec{c}$ are the position vectors of the points A

$$(2, 3, -4), B(3, -4, 5) and C(3, 2, -3)$$

respectively, then $|\vec{a} + \vec{b} + \vec{c}|$ is equal to

(A) $\sqrt{113}$

(B) $\sqrt{185}$

(C) $\sqrt{203}$

(D) $\sqrt{209}$

2. Find the distance of the point (a, b, c) from the x-axis.

3. (a) If $\vec{a} = 2\hat{i} - \hat{j} + 2\hat{k}$ and $\vec{b} = 5\hat{i} - 3\hat{j} - 4\hat{k}$, then find the ratio $\frac{projection of vector \vec{a} on vector \vec{b}}{projection of vector \vec{b} on vector \vec{a}}$

   (b) Let $\hat{a}$ and $\hat{b}$ be two unit vectors. If the vectors

$$\vec{c} = \hat{a} + 2\hat{b} \tag{1}$$

   and

$$\vec{d} = 5\hat{a} - 4\hat{b} \tag{2}$$

   are perpendicular to each other, then find the angle between the vectors $\vec{a}$ and $\vec{b}$.

4. Show that $|\vec{a}|\vec{b} + |\vec{b}|\vec{a}$ is perpendicular to $|\vec{a}|\vec{b} - |\vec{b}|\vec{a}$, for any two non-zero vectors $\vec{a}$ and $\vec{b}$.

5. Prove that three points A, B and C with position vectors $\vec{a}$, $\vec{b}$ and $\vec{c}$ respectively are collinear if and only if

$$(\vec{b} \times \vec{c}) + (\vec{c} \times \vec{a}) + (\vec{a} \times \vec{b}) = 0 \tag{3}$$