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

$$\vec{a} = 2\hat{\imath} - \hat{\jmath} + 2\hat{k} \tag{1}$$

and

$$\vec{b} = 5\hat{\imath} - 3\hat{\jmath} - 4\hat{k}, \tag{2}$$

then find the ratio

$$\frac{\text{projection of vector } \vec{a} \text{ on vector } \vec{b}}{\text{projection of vector } \vec{b} \text{ on vector } \vec{a}} \tag{3}$$

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

$$\vec{c} = \hat{a} + 2\hat{b} \tag{4}$$

and

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

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 $\vec{A}$, $\vec{B}$ and $\vec{C}$ with position vectors $\vec{a}$, $\vec{b}$ and $\vec{c}$ respectively are collinear if and only if

$$(\vec{b} \times \vec{c}) + (\vec{c} \times \vec{a}) + (\vec{a} \times \vec{b}) = 0 \tag{6}$$