# LATEX ASSIGNMENT

## ANAND

### 06-09-2023

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## EXERCISE 12.10.2

1. Compute the magnitude of the following vectors:

$$\vec{a} = \hat{i} + \hat{j} + k; \vec{b} = 2\hat{i} - 7\hat{j} - 3\hat{k}; \vec{c} = \frac{1}{\sqrt{3}}\hat{i} + \frac{1}{\sqrt{3}}\hat{j} - \frac{1}{3}\hat{k}$$

2. Write two different vectors having same magnitude.

3. Write two different vectors having same direction.

4. Find the values of $x$ and $y$ so that the vectors $2\hat{i} + 3\hat{j}$ and $x\hat{i} + y\hat{j}$ are equal.

5. Find the scalar and vector components of the vector with initial point $(2, 1)$ and terminal point $(-5, 7)$.

6. Find the sum of the vectors $\vec{a} = \hat{i} - 2\hat{j} + \hat{k}$, $\vec{b} = -2\hat{i} + 4\hat{j} + 5\hat{k}$ and $\vec{c} = \hat{i} - 6\hat{j} - 7\hat{k}$.

7. Find the unit vector in the direction of the vector $\vec{a} = \hat{i} + \hat{j} + 2\hat{k}$.

8. Find the unit vector in the direction of vector $\overrightarrow{PQ}$, where $P$ and $Q$ are the points $(1, 2, 3)$ and $(4, 5, 6)$, respectively.

9. For given vectors, $\vec{a} = 2\hat{i} - \hat{j} + 2\hat{k}$ and $\vec{b} = -\hat{i} + \hat{j} - \hat{k}$, find the unit vector in the direction of the vector $\vec{a} + \vec{b}$.

10. Find a vector in the direction of vector $5\hat{i} - \hat{j} + 2\hat{k}$ which has magnitude 8 units.

11. Show that the vectors $2\hat{i} - 3\hat{j} + 4\hat{k}$ and $-4\hat{i} + 6\hat{j} - 8\hat{k}$ are collinear.

12. Find the direction cosines of the vector $\hat{i} + 2\hat{j} + 3\hat{k}$.

13. Find the direction cosines of the vector joining the points $A(1, 2, -3)$ and $B(-1, -2, 1)$, directed from $A$ to $B$.

14. Show that the vector $\hat{i} + \hat{j} + \hat{k}$ is equally inclined to the axes $OX, OY$ and $OZ$.

15. Find the position vector of a point $R$ which divides the line joining two points $P$ and $Q$ whose position vectors are $\hat{i} + 2\hat{j} - \hat{k}$ and $-\hat{i} + \hat{j} + \hat{k}$ respectively, in the ratio 2 : 1

    (i) internally

    (ii) externally

16. Find the position vector of the mid point of the vector joining the points $P(2, 3, 4)$ and $Q(4, 1, -2)$.

17. Show that the points $A, B$ and $C$ with position vectors, $\vec{a} = 3\hat{i} - 4\hat{j} - 4\hat{k}, \vec{b} = 2\hat{i} - \hat{j} + \hat{k}$ and $\vec{c} = \hat{i} - 3\hat{j} - 5\hat{k}$, respectively form the vertices of a right angled triangle.

18. In triangle $ABC$ Fig. **??**, which of the following is not true:

    (a) $\overrightarrow{AB} + \overrightarrow{BC} + \overrightarrow{CA} = 0$

    (b) $\overrightarrow{AB} + \overrightarrow{BC} - \overrightarrow{CA} = 0$

    (c) $\overrightarrow{AB} + \overrightarrow{BC} - \overrightarrow{CA} = 0$

    (d) $\overrightarrow{AB} - \overrightarrow{BC} + \overrightarrow{CA} = 0$
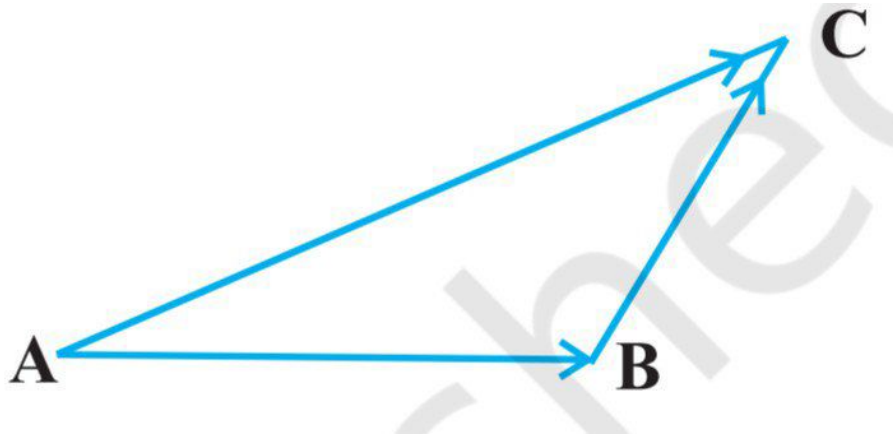


Figure 1: 10.18

19. If $a$ and $b$ are two collinear vectors, then which of the following are incorrect:

    (a) $\vec{b} = \lambda\vec{a}$, for some scalar $\lambda$

    (b) $\vec{a} = \pm\vec{b}$

    (c) The respective components of $\vec{a}$ and $\vec{b}$ are not proportional

    (d) Both the vectors $\vec{a}$ and $\vec{b}$ have same direction, but different magnitudes.