Chapter 1

1. The angle between the two vectors $\vec{A} = 2\hat{\imath} + 3\hat{\jmath} + \hat{k}$ and $\vec{B} = -4\hat{\imath} + 2\hat{\jmath} - \hat{k}$ is
   (a) an acute angle
   (b) an obtuse angle
   (c) a right angle
   (d) none of these

2. Two displacement vectors, $\vec{S}$ and $\vec{T}$, have magnitudes S = 3 m and T = 4 m. Which of the following could be the magnitude of the difference vectors $\vec{S} - \vec{T}$?
   (a) 5 m (b) 0 m (c) – 1 m (d) 8 m

3. Two vectors $\vec{A}$ and $\vec{B}$ both lie in the *xy*-plane. Which of the following is right?
   (a) It is possible for $\vec{A} - \vec{B}$ to have the same magnitude as $\vec{B} - \vec{A}$ but different directions
   (b) It is possible for $\vec{A}$ to have the same components as $\vec{B}$ but a different magnitude
   (c) It is possible for $\vec{A} + \vec{B}$ to have the same magnitude as $\vec{B} + \vec{A}$ but different directions
   (d) It is not possible for $\vec{A}$ to have the same magnitude as $\vec{B}$ but different components

4. Two vectors $\vec{A}$ and $\vec{B}$ both lie in the *xy*-plane. Which of the following is wrong?
   (a) It is possible for $\vec{A}.\vec{B}$ to have the same value as $|\vec{A} \times \vec{B}|$
   (b) It is not possible for $\vec{A}.\vec{B}$ to have a negative value
   (c) It is possible for $\vec{A} \times \vec{B}$ to vanish when both the vectors are either parallel or antiparallel
   (d) It is possible for $\vec{A}.\vec{B}$ to vanish when both the vectors are perpendicular to each other

5. $\vec{A} = a(3\hat{\imath} + 4\hat{\jmath})$, where a is a constant. What will be the value of a that makes $\vec{A}$ a unit vector?

(a) 0 (b) 0.1 (c) 0.2 (d) 0.3

6. The head of a vector is at the coordinate (3,4,7) and its tail is at (-2,5,1). Which of the following represents the vector correctly?

(a) $\vec{A} = 5\hat{\imath} - \hat{\jmath} + 6\hat{k}$
(b) (b) $\vec{A} = \hat{\imath} + 9\hat{\jmath} + 8\hat{k}$
(c) (c) $\vec{A} = 5\hat{\imath} + \hat{\jmath} + 6\hat{k}$
(d) (d) $\vec{A} = \hat{\imath} - \hat{\jmath} + 6\hat{k}$

7. (i) The vector $(\hat{i} + \hat{j} + \hat{k})$ is a unit vector. (ii) A unit vector can have any components with magnitude greater than unity.

(a) Both i and ii are correct
(b) i is correct but ii is wrong
(c) i is wrong but ii is correct
(d) both i and ii are wrong

8. Given two vectors $\vec{A} = -2.00\,\hat{i} + 3.00\,\hat{j} + 4.00\,\hat{k}$ and $\vec{B} = 3.00\,\hat{i} + 1.00\,\hat{j} - 3.00\,\hat{k}$, do the following.

(a) find the magnitude of each vector

(b) write the expression for the vector difference $\vec{A} - \vec{B}$ using unit vectors

(c) find the magnitude of the vector difference $\vec{A} - \vec{B}$. Is this the same as the magnitude of $\vec{B} - \vec{A}$? Explain.