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Phy101 Physics I
Quiz3-Vectors
October 19-20, 2026 15:00 & 10:00
Good Luck!

◇ Open Source Quiz
◇ Answer all the questions. Write the solutions explicitly and clearly. Use the physical terminology
◇ Calculator is allowed. You are not allowed to use any other electronic equipment in the exam

1. A) For the displacement vectors $\vec{a} = (3.0\ m)\hat{i} + (4.0\ m)\hat{j}$ and $\vec{b} = (5.0\ m)\hat{i} + (-2.0\ m)\hat{j}$, give $\vec{a} + \vec{b}$ in
   - i unit-vector notation
   - ii magnitude-angle (relative to $\hat{i}$) notation

   give $\vec{b} - \vec{a}$ in
   - iii unit-vector notation
   - iv magnitude-angle notation

   B) Here are three vectors in meters:

   $$\vec{d_1} = -3.0\hat{i} + 3.0\hat{j} + 2.0\hat{k}$$
   $$\vec{d_2} = -2.0\hat{i} - 4.0\hat{j} + 2.0\hat{k}$$
   $$\vec{d_3} = 2.0\hat{i} + 3.0\hat{j} + 1.0\hat{k}$$

   What results from
   - i $\vec{d_1} \cdot (\vec{d_2} + \vec{d_3})$
   - ii $\vec{d_1} \cdot (\vec{d_2} \times \vec{d_3})$
   - iii $\vec{d_1} \times (\vec{d_2} + \vec{d_3})$

2. A) Three vectors $\vec{a}, \vec{b}$, and $\vec{c}$ each have a magnitude of 50 m and lie in an xy-plane. Their directions relative to the positive direction of the x-axis are $30°, 195°$, and $315°$, respectively. What are
   - i the magnitude and the angle of the vector $\vec{a} + \vec{b} + \vec{c}$

ii the magnitude and the angle of the vector $\vec{a} - \vec{b} + \vec{c}$

iii the magnitude and the angle of a fourth vector $\vec{d}$ such that $(\vec{a} + \vec{b}) - (\vec{c} + \vec{d}) = 0$

B) Three vectors are given by:

$$\vec{a} = 3.0\hat{i} + 3.0\hat{j} - 2.0\hat{k}$$
$$\vec{b} = -1.0\hat{i} - 4.0\hat{j} + 2.0\hat{k}$$
$$\vec{c} = 2.0\hat{i} + 2.0\hat{j} + 1.0\hat{k}$$

What results from

i $\vec{a} \cdot (\vec{b} \times \vec{c})$

ii $\vec{a} \cdot (\vec{b} + \vec{c})$

iii $\vec{a} \times (\vec{b} + \vec{c})$