شماره‌ی تکلیف: ۱

این مسائل از فصل اول کتاب زیر گرفته شده است:

Title: The Fundamentals of Newtonian Mechanics: For an Introductory Approach to Modern Physics
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Year: 2024

مسئله‌ی ۱ :

1. What relation must be valid between the vectors a and b, which are different from each other and nonzero, so that the relation: $(\boldsymbol{a} + \boldsymbol{b}) \times (\boldsymbol{a} - \boldsymbol{b}) = 0$ is verified?

مسئله‌ی ۲ :

Show that if the magnitudes of the sum and difference between two vectors are equal, then the vectors are perpendicular to each other.

مسئله‌ی ۳ :

Two vectors $\boldsymbol{a}$ and $\boldsymbol{b}$ are equal in magnitude. Their sum has magnitude 4 and their vector product magnitude 16. Determine the magnitude of the two vectors.

پاسخ ۳ : $\sqrt{20}$

مسئله‌ی ۴ :

Two vectors $\boldsymbol{a}$ and $\boldsymbol{b}$ comply with the following conditions: (i) $\boldsymbol{a} \cdot \boldsymbol{b} = 20$; (ii) $(\boldsymbol{a} + \boldsymbol{b}) \cdot \boldsymbol{a} = 36$; (iii) $(\boldsymbol{a} + \boldsymbol{b}) \cdot \boldsymbol{b} = 45$. Determine the magnitude of the two vectors and the angle α between them.

پاسخ ۴ :

$$a = 4; \quad b = 5; \quad \alpha = 0$$

مسئله‌ی ۵ :

Given two vectors $\boldsymbol{a}$ and $\boldsymbol{b}$, show that in intrinsic representation their vector product. $\boldsymbol{a} \times \boldsymbol{b}$ corresponds to the oriented area of the parallelogram defined by the two vectors.