

## شماره‌ی تکلیف: ۱

**Problem 1:**

Please thoroughly study the chapter on vectors (Chapter 2) from the book below.

University Physics (Volume 1)

SAMUEL J. LING, JEFF SANNY, WILLIAM MOEBS

<https://openstax.org/books/university-physics-volume-1/pages/2-1-scalars-and-vectors>

مسائل بعدی از فصل اول کتاب زیر گرفته شده است:

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

**Author:** Maurizio Spurio

**Year:** 2024

**Problem 2:**

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

**Answer Problem 2:**  $\text{angle} = 0 + n\pi$

**Problem 3:**

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

**Problem 4:**

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

**Answer Problem 4:**

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