Soal untuk Tutorial 8 Aljali SI dan IF TA 2022/2023

1. Determine whether each set equipped with the given operations is a vector space. For those that are not vector spaces identify the vector space axioms that fail.
   a. The set of all real numbers with the standard operations of addition and multiplication
   b. The set of all pairs of real numbers of the form (x, y), where $x \geq 0$, with the standard operations on R^2.

2. In each part, determine whether the vectors span R^3.
   (a) $v_1 = (2, 2, 2)$, $v_2 = (0, 0, 3)$, $v_3 = (0, 1, 1)$
   (b) $v_1 = (2, -1, 3)$, $v_2 = (4, 1, 2)$, $v_3 = (8, -1, 8)$

3. In each part, determine whether the vectors are linearly independent or are linearly dependent in R^4.
   (a) (3, 8, 7, −3), (1, 5, 3, −1), (2, −1, 2, 6), (4, 2, 6, 4)
   (b) (3, 0, −3, 6), (0, 2, 3, 1), (0, −2, −2, 0), (−2, 1, 2, 1)

4. Show that the following matrices form a basis for M_{22}

$$\begin{bmatrix} 3 & 6 \\ 3 & -6 \end{bmatrix}, \begin{bmatrix} 0 & -1 \\ -1 & 0 \end{bmatrix}, \begin{bmatrix} 0 & -8 \\ -12 & -4 \end{bmatrix}, \begin{bmatrix} 1 & 0 \\ -1 & 2 \end{bmatrix}$$

5. Find the coordinate vector of v relative to the basis $S = \{v_1, v_2, v_3\}$ for R^3.
   (a) $v = (2, -1, 3)$; $v_1 = (1, 0, 0)$, $v_2 = (2, 2, 0)$, $v_3 = (3, 3, 3)$
   (b) $v = (5, -12, 3)$; $v_1 = (1, 2, 3)$, $v_2 = (-4, 5, 6)$, $v_3 = (7, -8, 9)$