Indian Institute of Information Technology, Design and Manufacturing, Kancheepuram

Linear Algebra-Assignment 2 Maximum marks: 05

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1. Let V be the set of all polynomials of degree at most 5 with real coefficients over the field $\mathbb{R}$, with usual addition and scalar multiplication of polynomials. Prove or disprove that V is a vector space.
2. Let $V = \mathcal{R}([a, b], \mathbb{R})$ be the set of all real valued Riemann integrable functions on $[a, b]$ over the field $\mathbb{R}$, with usual addition and scalar multiplication of functions. Prove or disprove that V is a vector space.
3. Suppose U is a subspace of V and V is a subspace of W. Show that U is a subspace of W.
4. Prove that the only non-trivial proper subspaces of $\mathbb{R}^2$ are straight lines passing through the origin.
5. Construct a basis for the set $\{(x_1, \dots, x_6) \in \mathbb{R}^6 : x_2 = 2x_1, x_4 = 4x_3, x_6 = 6x_5\}$.
6. Let $V = \mathbb{C}^2$. Determine conditions on $\alpha, \beta \in \mathbb{C}$ such that the vectors $(\alpha, 1)$, $(\beta, 1)$ in $\mathbb{C}^2$ are linearly dependent.