Úlohy ke cvičení

Úloha 1: Determine, whether the following sets of real functions form a subspace of the vector space of all real functions:

- The polynomials of degree at most 7,
- the polynomials f of degree at most 7 satisfying that $f(0) = 3$,
- the polynomials of degree at most 7 satisfying that -5 and 2 are among their roots,
- the monotone functions,
- the piecewise linear continuous functions.

Úloha 2: Let u, v, w be linear independent vectors in a vector space$V$ over the field $\mathbb{R}$. Decide, whether the following sets of vectors are linearly independent or not.

a) $\{u + v, u - v, u + w, u - w\}$.

b) $\{u + v, u + w, v + w\}$.

Úloha 3: Decide, whether the following set of vectors is independent in the arithmetic vector spaces $\mathbb{R}^4, \mathbb{Z}_3^4$ and $\mathbb{Z}_5^4$.

If not, find an expression of some vector as a linear combination of the others.

a) $X_3 = \{(1, 0, 2, 0)^T, (2, 1, 0, 2)^T, (0, 2, 2, 1)^T, (2, 2, 1, 1)^T\}$.

Úloha 4: Let V be a vector space and $X \subseteq Y \subseteq V$. Decide, which of the following claims are valid or not:

a) The se X is not independent, while the set Y is independent.

b) If the set X is independent, so is the set Y.

c) If the set Y is independent, o is the set X.