In the sequel, $V$ denotes a vector space defined over the field $\mathbb{F} = \mathbb{R}$ or $\mathbb{C}$ unless otherwise specified.

**Problem 1.** Read from the textbook: Chapter 2, Section 5-6.

**Problem 2 (20pts).** From the textbook. Ch. 2, Problem 4.1.

**Problem 3 (20pts).** From the textbook. Ch. 2, Problem 5.5.

**Problem 4 (20pts).** From the textbook. Ch. 2, Problem 5.6.

**Problem 5 (20pts).** Consider in the space $\mathbb{R}^3$ vectors $v_1 = (1, -1, 4)^T$, $v_2 = (3, 2, 1)^T$, $v_3 = (1, 4, -7)^T$, $v_4 = (-2, 3, 5)^T$.

a) Prove that this system of vectors is generating.
b) Extract a basis from this system.

**Problem 6 (20pts).** Let $V$ be a finite dimensional vector space. Let $U \subset V$ be a subspace. Show that if $\dim U = \dim V$, then $U = V$. 