Problem 1. Let $V$ be the subspace of $M_{23}$ consisting of all matrices $A$ that satisfy the condition $A \begin{pmatrix} 3 \\ 3 \\ 4 \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \end{pmatrix}$. Find a basis for $V$.

Problem 2. Let $V$ be the subset of $\mathbb{P}_3$ consisting of all polynomials $p$ that have the property $p(3) = 2p(-3)+3$. Is $V$ a vector space, if addition and scalar multiplication are the standard ones?

Problem 3. Are the following statements true or false? Give a brief reason or a counterexample for each.
   a. If $A$ is a $3 \times 4$ matrix, then the rows of $A$ are linearly independent.
   b. If $A$ is a $3 \times 3$ matrix and the rows of $A$ are linearly dependent, then the columns of $A$ are linearly dependent too.

Problem 4. Problem 9 from section 4.7

Problem 5. Suppose $A$ is an invertible matrix. Show, that if $\{v_1, v_2, \ldots, v_n\}$ form a basis for $\mathbb{R}^n$, then so do $\{Av_1, Av_2, \ldots, Av_n\}$. 