exercise 1:
9.2.2

exercise 2:
9.2.5

exercise 3:
11.4.2

exercise 4:
11.6.3

exercise 5:
11.6.4

exercise 6:
Let $e_1, ..., e_n$ be the natural basis of K^n. Let $a_0, ..., a_{n-1}$ be n scalars in K and M in $K^{n \times n}$ such that $Me_j = e_{j+1}$, if $j = 1, ..., n-1$ and

$$Me_n = -a_0 e_1 - a_1 e_2 ... - a_{n-1} e_n.$$

(i). Write down the matrix M.
(ii). Find $M^j e_1$ for $j = 0, ..., n$.
(iii). Find the characteristic polynomial of M.

exercise 7:
Let V be a vector space and $W, W_1, W_2, ..., W_p$ be subspaces. Assume that $V = W_1 \oplus W$ and $W = W_2 \oplus ... \oplus W_p$.
Show that $V = W_1 \oplus W_2 \oplus ... \oplus W_p$.

exercise 8:
11.6.1. Additional question: are D and N unique?