PART I

From Simon and Blume, do the following:

- Chapter 10: 10.4, 10.11, 10.13, 10.17, 10.20–22, 10.34–36, 10.39–40.

PART II

Q1. The vector notes contain the following statement. For $0 < k < n$, a $k$-dimensional plane in $\mathbb{R}^n$ may be defined as a linear combination of any $k$ linearly independent vectors, $b_i \in \mathbb{R}^n$ ($i = 1$ to $k$), plus another vector $b_0 \in \mathbb{R}^n$, i.e.:

$$\{ x \in \mathbb{R}^n \mid t_i \in \mathbb{R}, \ x = b_0 + \sum_{i=1}^{k} t_i b_i \}.$$  

It is further stated that the plane passes through the origin iff $b_0, b_1, \ldots, b_k$ are linearly dependent. An informal geometric argument is given in the notes. Give a formal algebraic proof, i.e., show both

(i) Plane passes through origin $\Rightarrow$ linear dependence of $b_0, b_1, \ldots, b_k$,
(ii) Linear dependence of $b_0, b_1, \ldots, b_k$ $\Rightarrow$ plane passes through origin.