Read from the textbook: Chapter 2, Sections 1–8.

You can collaborate on the problems as long as you write up all solutions in your own words and understand those solutions.

(1) (5 pts) From Ch. 1.10 in Apostol: Problems 1, 3, 5, 7, 9. Also, when appropriate exhibit a basis for $S$.

(2) (8 pts) From Ch.1.10 in Apostol: Problem 24. In (d), exhibit a vector space $V$, a subspace $S$, and a basis for $V$ which contains no basis for $S$.

(3) (8 pts) Let $V$ be a vector space and $U, W$ subspaces of $V$. Prove that if $U \cap W = \{0\}$ then $\dim L(U, W) = \dim U + \dim W$. (Do not appeal to a more general result for $\dim L(U, W)$).

(4) (4 pts) From Ch. 2.4 in Apostol: Problems 11–14. Determine whether $T$ is linear.