Homework Assignment 1, MATH 515, Spring 09

**Problem 1) (8 pts)** Let $S$ be a subset of a topological space $X$ and let $\overline{S}$ denote the closure of $S$.
(a) Prove that $\overline{S}$ is closed.
(b) If $S, T$ are subsets of $X$ and $S \subset T$, show that $\overline{S} \subset \overline{T}$.
(c) If $S, T$ are subsets of $X$, show that $\overline{S \cup T} = \overline{S} \cup \overline{T}$.
(d) Show that $\overline{S} = \overline{S}$.
(f) If $S \subset T \subset \overline{S}$, prove that $T = \overline{S}$.

**Problem 2) (8 pts)** page 44, Chapter II, §5, Exercise 3

**Problem 3) (8 pts)** page 45, Chapter II, §5, Exercise 5