The solo problem is:

- Let $X$ be a Hausdorff topological space, and let $Y = X \cup \{\infty\}$ be its one-point compactification. Show that the relative topology of $X$ as a subset of $Y$ is the same as the original topology on $X$.

The non-solo problems are:

- Chapter 2, Section J, Problem 1.

- Show that the one-point compactification of $(0, 1)$ with its usual topology is homeomorphic to a circle with its usual topology.

- Let $\mathbb{R}_d$ denote $\mathbb{R}$ with the discrete topology. Using the definition of limit point compactness directly, determine which of the following two subsets of $\mathbb{R}_d \times \mathbb{R}$ are limit point compact:

  \[
  A = \{(x, 4) \mid 1 \leq x \leq 2\},
  B = \{(3, y) \mid 1 \leq y \leq 2\}.
  \]

- Let $X$ be a limit point compact space and $A$ be a closed subset of $X$. Prove that $A$ is limit point compact in its relative topology.