Name: ______________________________ Score (Out of 5 points):

1. (1 point) Let $X = \{a, b, c, d\}$. Let $\mathcal{T}$ be the topology on X

$$\mathcal{T} = \{\varnothing, \{b\}, \{c\}, \{a, b\}, \{b, c\}, \{a, b, c\}, \{b, c, d\}, X\}.$$

(You do not need to verify that this is a topology). What is the subspace topology $\mathcal{T}_S$ induced on the subset $S = \{a, b, d\} \subseteq X$?

2. Suppose that $(X, \mathcal{T})$ is a topological space, and that $S \subseteq X$ a subset. Define a map

$$\begin{aligned} i : S &\to X \\ i(s) &= s. \end{aligned}$$

This map is called the *inclusion* of S into X.

(a) (2 points) Show that this map is continuous with respect to the topology $\mathcal{T}$ on X and the subspace topology $\mathcal{T}_S$ on S.

(b) (2 points) Suppose that S is an **open** set in the topological space X. Show that the map i is an open map. (Recall that this means that $i(V) \subseteq X$ is open for every open set $V \subseteq S$.)