Problem 1

Let $\varphi : X_0 \subset X \longrightarrow Y$ be a continuous map. Recall the construction of glueing X to Y via φ from class.

1. Show that Y can be considered to be a subspace of $X \cup_\varphi Y$. Show that the same is true for X if φ is a homeomorphism onto its image.

   Proof. It is
   $$X \cup_\varphi Y := (X \sqcup Y)/\sim$$
   $\square$

   $a \sim f(a)$

   We want to find a surjective map $\psi : Y \longrightarrow X \cup_\varphi Y$ such that $\psi(U)$ is open in the quotient topology.