Name: _____ Score (Out of 6 points):

1. (2 points) Let $p : \mathbb{R} \to \{a, b, c, d\}$ be the following map from the $\mathbb{R}$ (with the standard topology) to the set $\{a, b, c, d\}$,

$$p : \mathbb{R} \longrightarrow \{a, b, c, d\}$$
$$p(x) = \begin{cases} a, \ x \in (-\infty, 1) \\ b, \ x = 1, 2 \\ c, \ x \in (1, 2) \cup (2, 3) \\ d, \ x \in [3, \infty). \end{cases}$$

Write the induced quotient topology on $\{a, b, c, d\}$.

2. (4 points) Let (X, d) be a metric space with at least two elements. Show that there exist nonempty open sets in X whose closures are disjoint.