

Problem

Consider a countable collection of disjoint intervals $I_i = [a_i, b_i]$ and identify them all together at their left ends. More precisely, we consider the disjoint union of I_i and introduce the equivalence relation R given by xRy if and only if $x = y \in I_i \setminus \{a_i\}$, or $x = a_i$ and $y = b_j$ for some i and j .

- (a) If I_i is homeomorphic to $[0, 1]$ for i , then the resulting glued space is noncompact.
- (b) If I_i is homeomorphic to $[0, \frac{1}{i}]$, then the resulting glued space is compact and therefore has different topology than the quotient space w.r.t. R .