

Problem Set 6

1. Identify the two path components of the topologist's sine curve. Show that one of the components is closed and the other is not.
2. Prove that path connectedness is a topological invariant. Can you prove that it is a continuous invariant?
3. Prove that local connectedness is a topological invariant, but that the continuous image of a locally connected set need not be locally connected.
4. Prove that every locally path connected space is locally connected.
5. Prove that every finite subset of a topological space is compact.