Home assignment #3

236358: Topology in Distributed Computing

Due date: negotiable

Please answer all the following questions (equal weight); submit your solutions printed, with adequate margins and spacing.

1. Show that the pseudo-sphere of two processes over \{0, 1\} is homeomorphic to a sphere and use this to argue that it connected.

2. For processes \(p_0, \ldots, p_4\), calculate the core set of the following survivor set: \(\{p_i, p_3, p_4\ : i \in \{0, 1, 2\}\} \cup \{p_0, p_1, p_2, p_i : i \in \{3, 4\}\}\).

3. Does the duality between survivor sets and cores holds also without the containment property?

4. Prove the fact from Slide 45: If \(C\) is shellable and each facet has dimension \(\leq k\) then \(C\) is \((k - 1)\)-connected. Hint: Use the nerve lemma.