Topology (Math 3281)

Homework Problem Set 3 07.11.14

This set of homeworks will be collected in the lecture on 21.11.14.

1. Let X be a topological space and $\Delta : X \to X \times X$ be the map given by $\Delta(x) = (x, x)$ for all $x \in X$. Show that X is a Hausdorff space if and only if the image $\Delta(X) \subset X \times X$ is closed in $X \times X$.

2. Let

$$X \quad = \quad \{0\} \cup \{1/n \,|\, n \geq 1, n \in \mathbb{Z}\}.$$

   Determine the connected components of X.

3. Show that the continuous image of a path-connected space is path-connected.

4. Decide which of the following subspaces of the plane are homeomorphic. Justify your statements.

(a) 

(b) 

(c) 

(d) 

(e)