

Discussion: 02.05. - 04.05.

Exercise Sheet 3

Exercise 3.1: Homeomorphism Examples

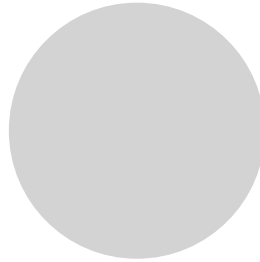
(4 Punkte)

Which of the following three objects are homeomorph?

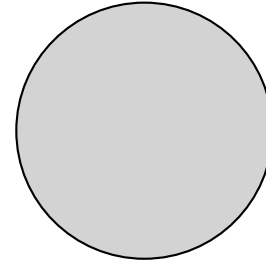
circular disk (without boundary)



square disk (with boundary)



circular disk (with boundary)



Exercise 3.2: Homeomorphism in Trees

(4 Punkte)

Consider two finite trees T_1 and T_2 without root or order. When are T_1 and T_2 isomorph and when homeomorph?

Exercise 3.3: Homeomorphism by Bijection

(4 Punkte)

Prove the following statement from the lecture:

Let X be a compact space, Y be a Hausdorff space and $f : X \rightarrow Y$ a continuous bijection. Then f is a homeomorphism.

Hint: Consider the inverse function $g = f^{-1}$. We need to show that $g : Y \rightarrow X$ is continuous. It suffices to show that for any $V \subseteq X$ it holds: if V is closed in X then $g^{-1}(V) = f(V)$ is closed in T_2 .