TOPICS IN MODERN GEOMETRY
TOPOLOGY
HOMEWORK SHEET 3

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Exercise 1. Show that a finite set is compact with respect to the discrete topology. Give an example of an infinite discrete subset of a compact space.

Exercise 2. Let $f : X \to Y$ be a continuous map between topological spaces. Show that

(1) If X is compact, then $f(X)$ is compact;
(2) If X is connected, then $f(X)$ is connected.

Exercise 3. One may infer that S^1 is not homeomorphic to $\mathbb{R}$ through both a compactness argument and through a connectedness argument. Can you write two such arguments down?

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