Prof. Dr. Alexander Lytchak Summer Term 2022

Metric Geometry

Exercise Sheet 2

You can find information about the exercise class on our homepage. If you have problems with some of the exercises or search for further exercises, the script (especially Appendix A) might be helpful.

Exercise 1

Let X be a complete length space and $K \subset X$ compact. Show that there is a compact and path-connected subset $K \subset K' \subset X$.

Exercise 2

Construct a locally compact geodesic space X such that the completion of X is not geodesic.

Exercise 3

Let X be a compact metric space. Show that X is isometric to a subspace of a compact geodesic space.

Exercise 4

Let Y be a metric space, $X \subset Y$, f an extension function on X and $d \geq 0$. Prove the following:

a) The map $\bar{f}(y) = \inf_{x \in X}\{f(x) + |x-y|\}$ is an extension function on Y.

b) If $diam(Y) \leq d$, then $\bar{f}_d := \min\{\bar{f}, d\}$ is an extension function on Y.