

Metric Geometry

Exercise Sheet 10

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

Give an example of a puff pastry which is not end-to-end convex and not simple such that the intersection of the underlying convex closed subsets is non-empty.

Exercise 2

Show that the map Φ constructed in the proof of 9.2 is open and locally distance-preserving.

Exercise 3

- a) Let X be a locally simply connected compact length space which is not simply connected. Show that there is a closed curve γ such that for every $x, y \in \text{im}(\gamma)$ one of the corresponding subcurves between x and y is a geodesic. Finally connect the statement with the Globalization Theorem.
- b) Does the statement also apply to complete geodesic locally $\text{CAT}(0)$ spaces which are not simply connected?
(Hint: You may use results from <https://arxiv.org/pdf/2012.11814.pdf>.)