

Metric Geometry

Exercise Sheet 12

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

- a) Consider the unit square and connect diagonal vertices and opposite midpoints on the edges by line segments. Further glue the square along opposite edges. Show that the finite euclidean simplicial complex is locally $CAT(0)$.
- b) Now consider the corresponding finite euclidean simplicial complex such that every triangle is equilateral of side length 1. Show that the space is not locally $CAT(0)$.

Exercise 2

Glue finitely many unit squares along edges. Under which condition is the resulting space locally $CAT(0)$?

Exercise 3 Let X be a 2-dimensional finite euclidean simplicial complex such that every simplex of dimension less than two is contained in a triangle. Show that X is a 2-manifold (possibly with boundary) if X is non-negatively curved.