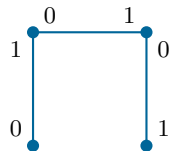# Algebraic Topology: Études
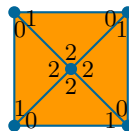
Prof. Dr. C. Löh/M. Uschold/J. Witzig   Sheet 13, January 28, 2022
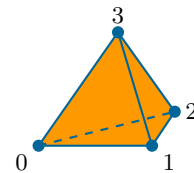

Exercise 1 (barycentric subdivision). Draw the barycentric subdivision of the following singular chains (assuming that everything is parametrised affinely and that every singular simplex has coefficient 1)!

1-chain   2-chain   3-chain

Exercise 2 (Jordan curve theorem, low dimensions).

1. Does the Jordan curve theorem hold in dimension 0 ?

2. Does the Jordan curve theorem hold in dimension 1 ?

3. Is there a Jordan curve theorem for continuous injective maps $S^1 \longrightarrow D^2$?

Exercise 3 (Jordan curve theorem, crayon version). Which of the following sub-spaces of $\mathbb{R}^2$ are homeomorphic to S^1 ? Why?

Exercise 4 (summary). Write a summary of Chapter 4.2 (Homotopy Invariance) and Chapter 4.3 (Excision), keeping the following questions in mind:

1. What are the geometric ideas behind these proofs?

2. How are these geometric ideas translated into algebra?

3. How do these proofs compare to the proofs of the corresponding results for π_1 ?

No submission!