

Discussion: 18.04. - 18.04.

Exercise Sheet 1

Exercise 1: Affine Independency

(4 Punkte)

Prove the following observations mentioned during the lecture:

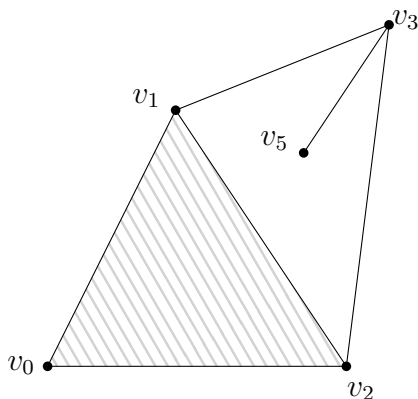
- (i) v_0, \dots, v_n affine independent $\Leftrightarrow v_1 - v_0, v_2 - v_0, \dots, v_n - v_0$ linear independent
- (ii) An n -simplex can exist only in \mathbb{R}^d , where $n \leq d$
- (iii) v_0, \dots, v_n affine independent $\Rightarrow v_0, \dots, v_n$ are in convex position, i.e. $ch(v_0, \dots, v_n)$ contains no v_i in its topological interior

Exercise 2: Simplicial Complexes

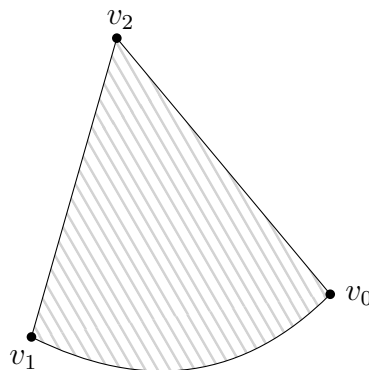
(4 Punkte)

Are the following objects in \mathbb{R}^2 simplicial complexes? Argue why or why not!

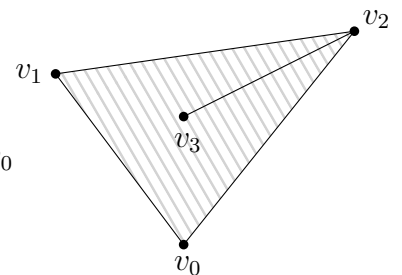
(i)



(ii)



(iii)



Exercise 3: δ and permuted order

(4 Punkte)

Prove the following observation about δ and any permutation π :

$$\delta \langle v_{\pi(0)} \dots v_{\pi(i)} \rangle = (-1)^{\text{sign}(\pi)} \delta \langle v_0 \dots v_i \rangle$$