

Differential Geometry III – Homework 04

Submission: November 21, 2018, 12:15 am

1. Exercise

(4 points)

Let $C_p(K)$ denote the group of oriented p -chains ($p \in \mathbb{Z}$). The *boundary operator* ∂_p is defined as follows:

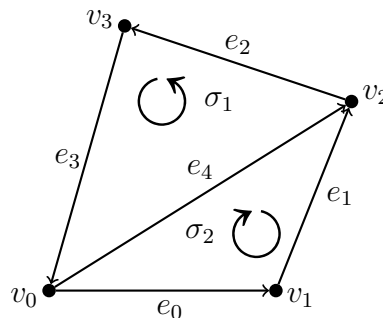
$$\begin{aligned} \partial_p : C_p(K) &\rightarrow C_{p-1}(K) \\ [v_0, \dots, v_p] &\mapsto \partial_p[v_0, \dots, v_p] = \sum_{i=0}^p (-1)^i [v_0, \dots, \hat{v}_i, \dots, v_p]. \end{aligned}$$

Show: $\partial_{p-1} \circ \partial_p = 0$.

2. Exercise

(4 points)

Consider the following oriented simplicial complex K :



Determine the *first homology* $H_1(K)$.

Total: 8