Inspiring Excellence

Algebriac Topology III (MAT484)

Lecture Notes

Contents

1 Singular Homology Groups

Let $\mathbb{R}^\infty$ denote the generalized Euclidean space $\mathbb{E}^J$, with J being the set of positive integers. An element of the vector space $\mathbb{R}^\infty$ is an infinite sequence of real numbers (functions from $\mathbb{N}$ to $\mathbb{R}$) with finitely many nonzero entries. Let Δ_p denote the p-simplex in $\mathbb{R}^\infty$ having vertices

$$\begin{aligned}
\varepsilon_0 &= (1, 0, 0, \ldots, 0, \ldots) \ , \\
\varepsilon_1 &= (0, 1, 0, \ldots, 0, \ldots) \ , \\
&\ldots \\
\varepsilon_p &= (0, 0, 0, \ldots, \underbrace{1}_{(p+1)\text{-th entry}}, \ldots) \, .
\end{aligned}$$

We call Δ_p the **standard p-simplex**. In this notation, Δ_{p-1} is a face of Δ_p.

Definition 1.1 (Singular p-simplex)**.** Let X be a topological space.