ADAMS SPECTRAL SEQUENCE-II

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1. Review

We first review some basic preliminaries on the lecture of Adams spectral sequence-I.

1.1. **Spectrum.**

Definition 1.1. We can define a **spectrum** E as the following two equivalent ways:

- A sequence of pointed spaces $\{E_n\}_{n\in\mathbb{Z}}$ together with morphisms $\sigma_n : \Sigma E_n \to E_{n+1}$.
- A sequence of pointed spaces $\{E_n\}_{n\in\mathbb{Z}}$ together with isomorphisms $\tilde{\sigma}_n : E_n \xrightarrow{\sim} \Omega E_{n+1}$.

Theorem 1.2 (Brown Representability Theorem)**.** *For any reduced*

Theorem 1.3 (Symmetric Monoidal Structure on Spectra)**.**

Definition 1.4 (Ring Spectrum)**.**

1.2. **Eilenberg-MacLane Spectrum.**

Definition 1.5 (Delooping)**.**

Definition 1.6 (Eilenberg-MacLane Space)**.**

Definition 1.7 (Eilenberg-MacLane Spectrum)**.**

Theorem 1.8 (Ring Structure on Eilenberg-MacLane Spectrum)**.**

1.3. **Cohomology Operations and Stable Cohomology Operations.**

Definition 1.9 (Cohomology Operation)**.**

Definition 1.10 (Stable Cohomology Operation)**.**

Yoneda + Brown representability theorem.

2. Hopf Algebra

Definition 2.1 (Algebra and Coalgebra over a Monoidal Category)**.**

Definition 2.2. Bialgebra

Example 2.3 (k-module)**.**

Definition 2.4 (Hopf Algebra)**.**