Math 572
Spring 12
Take-home final
Faculty: R. Kaufmann

Name:

Signature:

Student ID Number:

Directions: Please drop off in my mailbox by 05/02 3:00 pm or send a pdf (scan) file to rkaufman@math.purdue.edu with a cc to kaufmann.ralph@gmail.com

There are two parts. General questions and exercises from the book. Please do both parts!

Use this page as a cover page.

Review questions

Problem 1: a) Give the axioms of a homology theory. b) How are they related to the axioms of a cohomology theory.

Problem 2: Are the chain groups of singular and simplicial chains free? If so give a basis.

Problem 3: Prove that the singular homology groups are functorial.

Problem 4: Give a sketch of the proof that for a triangulable space the singular and simplicial homology are isomorphic.

Problem 5: How is the chain complex of a CW complex defined. Give the chain groups and a definition of the differential. Also, are the chain groups free? If so give a basis.

Problem 6: Define an excisive couple. Show how to get the Mayer–Vietoris sequence and the general relative cup product on p. 291.

Exercises from Munkres

§41: 2

§42: 2 (in Example 2 check that z^1 and d^1 are cocycles and the calculation that they are cohomologous, in Example 4 check that the coboundary of $(e_1^* + \cdots + e_9^*)$ is $2\sigma^*$)

§44: 3

§47: 1,3 (you do not need to give the simplicial cocycles), 7

§49: 3 (b)