Homology Theory
Notes & Exercises from my Independent Study

(Or: *If I could save Klein in a bottle ♪)*

Forest Kobayashi

Department of Mathematics
Harvey Mudd College

Supervised By
Francis Su[1]

Last Updated: January 23, 2019

_____

[1]Department of Mathematics, Harvey Mudd College

Contents

1. Introduction

This document is a compendium of notes, exercises, and other miscellany from my independent study in Homology Theory.

2. Chapter 12: Classification of 2-Manifolds

2.1 Examples of 2-Manifolds

12.1. Show that the torus $\mathbb{T}^2$ is homeomorphic to $\mathbb{S}^1 \times \mathbb{S}^1$

Proof. Let $\sim$ be the relation on $[0,1] \times [0,1]$ defined as follows: $\forall x \in [0,1]$,

$$\begin{cases} (0,x) \sim (1,x) \\ (x,0) \sim (x,1) \end{cases}$$

and $\sim$ relates no other points. Then $\mathbb{T}^2 \cong ([0,1] \times [0,1]/\sim)$ ■