

Math 527 - Homotopy Theory
Spring 2013
Homework 4, Lecture 2/4

In this problem set, let **Top** denote the usual category of all topological spaces and continuous maps between them.

Problem 1. Let $U: \mathbf{Top} \rightarrow \mathbf{Set}$ denote the underlying set functor.

- a. Show that U has a left adjoint, and describe it explicitly.
- b. Show that U has a right adjoint, and describe it explicitly.

Problem 2. Show that the category **Top** is complete (i.e. has all small limits).

Remark. A similar argument will show that **Top** is cocomplete (i.e. has all small colimits). It is not assigned as homework, but is a recommended exercise.