

Topology, fall 2022

Homework 4, due Friday October 7.

Read Munkres sections §20 – 21 and §23 (we'll finish §24 material on Monday and we have not yet covered uniform convergence at the end of §21).

I. Give an example of a continuous map $f : X \rightarrow Y$ such that f is an injective map of sets and the topology on $f(X)$ is weaker than the topology on X (under the bijection f between X and $f(X)$).

II. Classify all continuous maps from $X = \{a, b\}$ with open sets $\emptyset, \{a\}, X$ to $Y = \{x, y\}$, where Y has the discrete topology.

III-V. Exercises 3a on page 126, 2 on page 133, and 4 on page 134,

VI-VII. Exercises 2, 4 on page 152.

VIII. Which of the topological spaces in Figure 12.1 (Munkres, page 76) are connected? For each space which is not connected, specify a separation.

The midterm will cover the material of Sections 12-21 (not including uniform continuity at the end of Section 21) and Section 23.

Additional problems to think about and prepare for the midterm (do not submit):

Exercise 7 on page 118.

Exercises 3, 7, 8, 9, 11 on page 152.

Exercise 5 on page 152 and its extension: show that the Cantor set is totally disconnected.

(These problems are mostly on connectedness. I'll separately email you with more detailed information on the midterm.)