

Homework 8

Due Wednesday, October 28 at 1:00pm

Instructions:

- To receive full credit, a solution must be clear, concise, and correct.
- Problems marked with * are *extra credit problems* and these are *optional*.
- If a problem asks a question with a “yes” or “no” answer, you must provide a proof of whatever answer you give.

(—) From the textbook: 28.6, 29.2a, 29.3, 30.2, 30.5, 30.15, 31.3

(P1) * Give an example of a metric space with no isolated points that is not separable (i.e. which has no countable dense subset).

(P2) * Show that the *Cantor set*, which was constructed and studied in problem 27.6 from the textbook, is homeomorphic to $\{0, 1\}^\omega$ (the countably infinite product of a two-point set).

(P3) * Determine whether or not \mathbb{R}^ω with the box topology is T_4 .[†]

[†]This is actually an open problem, and its solution would be publishable mathematical research! However I wanted to also make it clear that you would get extra credit in Math 445 for solving it.