

(Math 360) Homework 3:

Due February 5, 2009

All numbered exercises are from Rudin's Principles of Mathematical Analysis.

Exercise 1: Let A_1, A_2, \dots be subsets of a metric space.

(a) Suppose $B_n = \bigcup_{i=1}^n A_i$. Prove $\overline{B_n} = \bigcup_{i=1}^n \overline{A_i}$

(b) If $B = \bigcup_{i=1}^{\infty} A_i$ prove $\overline{B} \supset \bigcup_{i=1}^{\infty} \overline{A_i}$

(c) Given an example where $\overline{B} \neq \bigcup_{i=1}^{\infty} \overline{A_i}$

Exercise 2: Suppose (X, d) is a metric space and $E \subseteq X$ is any subset. Show that there is a subset Y of X such that E is open in (Y, d) .

Exercise 3: Chapter 2, Exercise 6.

Exercise 4: Chapter 2, Exercise 9.

Exercise 5: Chapter 2, Exercise 14.

Exercise 6: Chapter 2, Exercise 15.

Exercise 7: Chapter 2, Exercise 16.

Exercise 8: Chapter 2, Exercise 21.

Exercise 9: Chapter 2, Exercise 22. (Recall a set is countable if there is a bijection between it and \mathbb{N}).

Exercise 10: Chapter 2, Exercise 23.

Exercise 11: Chapter 2, Exercise 25.