

Complex Analysis 1, MATH 5510, Fall 2017

Homework 5, Section II.3 and II.4

Due: Friday, October 6 at 1:40

Write in complete sentences!!! *Explain* what you are doing and convince me that you understand what you are doing and why. Justify all steps by quoting relevant results from the textbook or hypotheses.

II.3.2. Let (X, d) be a complete metric space and let $Y \subset X$. Prove that if Y is closed in X then (Y, d) is a complete metric space. HINT: Use Proposition II.3.4(a).

II.3.3. Prove that $\text{diam}(A) = \text{diam}(A^-)$. HINT: The $\text{diam}(A) \leq \text{diam}(A^-)$ part is easy. For $\text{diam}(A^-) \leq \text{diam}(A)$, use the fact that for given $\varepsilon > 0$ there are $x', y' \in A^-$ such that $d(x', y') > \text{diam}(A^-) - \varepsilon/2$ (a property of suprema). Also, x' and y' are either in A or limit points of A by Proposition II.3.4(b)

II.4.4. Prove that the union of a finite number of compact sets is compact.