Complex Variables, MATH 4337/5337, Fall 2024

Homework 4: Section 1.11. Regions in the Complex Plane, 2.12. Functions of a Complex Variable

Due Saturday, February 17 at 11:59 pm

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. The exercise numbers are based on the 9th edition of the textbook.

1.12.10. Prove that a finite set of points $S = \{z_1, z_2, \ldots, z_n\}$ cannot have any accumulation points.

2.14.2. In each case, write the function $f(z)$ in the form $f(z) = u(x, y) + iv(x, y)$. **(a)** $f(z) = z^3 + z + 1$, **(b)** $f(z) = \dfrac{\overline{z}^2}{z}$ where $z \neq 0$.

2.14.4. Write the function $f(z) = z + 1/z$ where $z \neq 0$ in the form $f(z) = u(r, \theta) + iv(r, \theta)$.

1.12.8. (Graduate) Prove that if a set contains each of its accumulation points, then it must be a closed set. NOTE: This is the converse of Lemma 1.11.B.