Math 427 – Midterm Study Topics

Section 1.1: Properties of $\mathbb{C}$: multiplication, inverse, conjugation, modulus and triangle inequality, Theorem 1.1.7.

Section 1.2: Definition of convergence; simple examples.

Section 1.3: Properties of the function e^z, including Theorems 1.3.2, 1.3.6, 1.3.7. Definition 1.3.8 for $\sin z$, $\cos z$.

Section 1.4: The polar form, and using it to find powers, roots, and logarithms. The multi-valued function $\arg(z)$, and its relation to log, for example in Theorem 1.4.8. Know what the principal branch of $\log(z)$ is.

Section 2.1: Recognize simple open and closed sets; know the ϵ, δ definition of continuous functions.

Section 2.2: Definition of complex derivative, Theorems 2.2.6 and 2.2.7 Know how to set up functions in $u + iv$ form and apply the Cauchy-Riemann equations. (You do not need to know about harmonic functions.)

Section 2.3: Contour integrals. Be able to use Definition 2.3.8 to write them explicitly.

Section 2.4: Know how to parametrize line segments $[z_0, z_1]$ and circles (and semicircles). Length of a path, and Theorem 2.4.9.

Section 2.5: Know the statements of Theorems 2.5.6, 2.5.8, and 2.5.9, which I proved another way.

Section 2.6: Existence of anti-derivatives on open convex sets. You need study only through Corollary 2.6.3 for the midterm.