Complex Analysis Preliminary Exam Syllabus

Department of Mathematical Sciences

University of Cincinnati

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Complex arithmetic and elementary functions. Complex differentiability, complex versus real differentiability, the Cauchy-Riemann equations. Holomorphic maps: complex versus real differentiability, Cauchy-Riemann equations, conformal and isogonal diffeomorphisms, power series. Complex line integrals. Cauchy's theorem and integral formulas, winding numbers, Morera's theorem, Liousville's theorem, maximum principle, Schwarz's lemma. Harmonic functions. Taylor series. Isolated singularities, Laurent series, residue theorem, argument principle, evaluation of definite integrals, the open mapping theorem. The Riemann sphere and stereographic projection. Conformal mappings, Mobius transformations, Riemann mapping theorem.

This material is covered in MATH 7002.

Texts:
Lars Ahlfors, *Complex Analysis* (3rd edition).
Bruce Palka, *An Introduction to Complex Function Theory* (1st edition).