Real Analysis Preliminary Exam Syllabus

Department of Mathematical Sciences

University of Cincinnati

(Updated October 2020)

Measure and integration with emphasis on the real line and the plane. Measures and measurable functions, Lusin and Egoroff theorems, Lebesgue integral, Fatou's lemma, monotone and dominated convergence. Convergences: uniform, a.e., in measure, in mean. Product measures, Fubini and Tonelli theorems. Radon-Nikodym theorem. Absolute continuity, bounded variation, and the fundamental theorem of calculus on the real line. L^p-spaces.

This material is covered in MATH 7001.

Texts:

H. L. Royden and P. M. Fitzpatrick, *Real Analysis*, 4e, Pearson, 2010 (Chs. 1–7, 17, 18, 20).

G. Folland, *Real Analysis: Modern Techniques and Their Applications*, 2e, Wiley.

T. Tao, *An Introduction to Measure Theory*, AMS, 2011 (also available online).

T. Tao, *An Epsilon or Room, I: Real Analysis*, AMS, 2010 (also available online).