

MATH 55A (2006), PROGRAM

Week 1.

Day 1: basics of sets, functions.

Day 2: equivalence relations, countability.

Day 3: metric spaces (examples).

Week 2.

Day 1: open and closed subsets in metric spaces, continuity.

Day 2: complete metric spaces, completeness of \mathbb{R} .

Day 3: examples of complete and non-complete metric spaces.

Week 3.

Day 1: no class.

Day 2: exam.

Day 3: completions.

Week 4.

Day 1: no class.

Day 2: topological spaces.

Day 3: compactness.

Week 5.

Day 1: compactness in metric spaces, local compactness

Day 2: categories.

Day 2: categories, continued

Week 6.

Day 1: categories, groups.

Day 2: rings, modules, vector spaces.

Day 3: recap representable functors.

Week 7.

Day 1: no class—mandatory office hours.

Day 2: spans, linear dependence, bases, dimension.

Day 3: recap dimension; tensor products.

Week 8.

Day 1: tensor products, relation to Hom, trace.

Day 2: tensor product over a ring.

Day 3: no class: veteran's day.

Week 9.

Day 1: review tensor products.

Day 2: tensor algebra.

Day 2: inner products.

Week 10.

Day 1: Hilbert spaces.

Day 2: Banach spaces.

Day 2: Thanksgiving.

Date: April 14, 2008.

Week 11.

Day 1: differentiability.

Day 2: higher differentials.

Day 3: inverse function thm.

Week 12.

Day 1: inverse, implicit functions; diff. eqn's.

Day 2: proof of existence for diff. eqn's.

Day 3: differentiability of solution

Week 13.

Day 1: homotopy, path space.

Day 2: fundamental group.

Day 3: covering spaces.