Math 205A
Fall 2008

UPDATED GENERAL INFORMATION — NOVEMBER 20, 2008

The lecture section of the class **WILL MEET** on **Wednesday, November 26.**

Here are some suggestions for study in connection with studying for the second midterm examination, which will take place on **Monday, November 24.** The previously stated comments in `update05f08.pdf` also apply; the material below is more detailed.

As in `update02f08.pdf`, these suggestions are meant as a guideline to recognize the important points. Not everything listed will be covered, and although an effort has been made to ensure that the list is consistent with the problems on the test, for several reasons this cannot be guaranteed. The questions are not designed to be hard and they will be less indirect than those on the first examination, but they may be formulated from slightly different viewpoints than one finds in the notes or the exercises and some are likely to involve the putting together of information from distinct topics in the course.

Basic concepts. It is important to know the basic definitions of objects and properties like completions of metric spaces, nowhere dense subsets, meager sets, connectedness, connected components, local connectedness, arcwise connectedness, the quotient topology and quotient maps, the disjoint union construction, second countable spaces, separability, and the Lindelöf Property.

Proofs of basic results. An active understanding of the following types of results will be assumed: The result on unions of nowhere dense subsets, the results on unions and closures of connected subsets, the partial analogs in the arcwise connected case, the results on continuous images of connected and arcwise connected subsets, connected components and arc components, the equivalence between these notions for open subsets of Euclidean spaces, the fact that open or closed surjections are quotient maps, the composition (a.k.a. Gertrude Stein) property for quotient maps, the logical relations among the concepts of second countability, separability, and the Lindelöf Property, and the results which state that some of these properties are preserved under taking subspaces and others are preserved under taking products.

Acquaintance with basic results. Knowing and understanding the statements of results like the existence and essential uniqueness of the completion of a metric space (including the result on extending certain mappings to the completion), Baire's Theorem on the nonmeagerness of complete metric spaces in themselves, the characterizations of local connectedness and local arcwise connectedness, the cardinality of the set of connected subsets of the plane, the equivalence properties leading to the concepts of components and arc components, the characterization of connected subsets of the real line, and the basic properties of disjoint union spaces.

Knowledge of examples. It will be helpful to know examples which illustrate the basic definitions and yield negative statements about certain basic concepts; these include examples showing that the intersection of two connected subsets need not be connected, an example of a metric space which is meager in itself, an example of a connected space which is neither locally connected nor arcwise connected, examples of disconnected spaces, examples of spaces for which connected components are not necessarily open subsets, the existence of quotient maps which are not open or closed, one or more examples of quotient maps such that the domain is metrizable but the codomain is not even Hausdorff, and the existence of spaces which are either separable or have the Lindelöf property but are not second countable.