Math 205A
Fall 2005
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Here are some suggestions for things to study in connection with the second midterm examination. This list is furnished with disclaimers that not everything on it will appear on the examination and there might be items on the examination that do not appear to fit into any of these categories (however, at the time of writing the exam has been completed and this list has been compiled with knowledge of the examination's contents).

(1) Recognize compact, complete and connected subsets of the real line.

(2) More generally, understand the relation between the concepts of compactness and completeness for metric spaces and their closed subsets.

(3) Understand the definition and basic properties of nowhere dense and meager subsets, the statement of Baire's Theorem, and know examples of metric spaces whose topologies do not support complete metrics.

(4) The logical relationships between connectedness and its variants (local connectedness and arcwise connectedness) and specifically how these concepts are related for basic types of subsets of Euclidean spaces (*e.g.*, open and closed subsets).

(5) Understand the statements of the results on the existence of completions for metric spaces and the uniqueness of such completions up to isometry.

(6) Understand the basic results on connected components of a topological space as well as the corresponding notion of arc component and the logical relationships between the two concepts.

(7) Know the definition of quotient topology, and given a continuous surjection $f : X \to Y$, know how to determine whether a given topology is the quotient topology by means of the definitions or special conditions on the mapping f (*e.g.*, open or closed).

This examination will consist of four problems, just like the first one.