MATH 363
Spring 2009

Hour Exam Preparation
February 24, 2011

For the midterm you should:

- be able to define the following terms and concepts. It is sufficient to be able to write logically correct definitions. It's not necessary to know definitions word for word.
- be able to use the following terms and concepts.
- be familiar with a collection of examples that illustrate the different terms and concepts. Many examples can be used to illustrate multiple terms and concepts.
- be able to prove simple properties of or relationships between terms and concepts.

Terms and Concepts

- properties of sets under union, intersection, and complements.
- properties of unions, intersections, and complements with respect to functions between sets.
- topology (as a collection of sets satisfying three properties)
- topological space, $(X, \mathcal{T})$
- open set, neighborhood
- limit point, closed set
- closure, interior, and boundary (frontier) of a set in a topological space
- discrete topology, indiscrete topology
- distance function on $\mathbb{R}^n$
- open ball, closed ball in $\mathbb{R}^n$
- usual topology on $\mathbb{R}^n$, $(\mathbb{R}^n, \mathcal{U})$
- open set in $(\mathbb{R}^n, \mathcal{U})$
- half-open topology on $\mathbb{R}$
- relative or subspace topology. $(Y, \mathcal{T}|_Y)$
- open, closed sets in the subspace topology
- continuous function between topological spaces
- homeomorphism
- metric, metric space, metric space topology
- distance from a point to a set $d(x, A)$.
- continuity of the distance function $d_A(x) = d(x, A)$ for a fixed set A
- product space, product space topology, $(X \times Y, \mathcal{S} \times \mathcal{T})$
- projection map, inclusion map of product space
- topological property
- Hausdorff topological space
- connected, disconnected topological space
- connected, disconnected subset of a topological space
- connected component of a set or topological space
- bounded subset of $\mathbb{R}^n$
- compact subset of $\mathbb{R}^n$

- open cover of a topological space
- finite subcover of an open cover
- compact topological space
- Heine-Borel theorem
- compact metric space, Lebesgue lemma
- locally compact set or space
- the standard sphere $S^n \subset \mathbb{R}^n$
- cylinder, annulus as product spaces
- two dimensional torus, three dimensional torus as product spaces
- the space of continuous function $f : [0,1] \to \mathbb{R}$ with distance function $d(f,g) = \max|f(x) - g(x)|$