MATH 0413 Fall 2011 Mini-quizzes Material

Wed., 8/31
Statement (Proposition)
Logical constructions: negation, ”and”, ”or”, implication, equivalence (with truth tables)
   Tautology
   Negation of ”and” and ”or”

Fri., 9/02
Contrapositive, converse
Transitivity of implication
Quantifiers
Negation of quantifiers and negation of ”and” and ”or”

Wed., 9/07
Sets, elements, (with the notation)
Subsets
Cartesian product of two sets
Maps between sets
Image of a subset, image of a map

Fri., 9/09
Injective, surjective, bijective maps
Inverse image of a subset
(HW: figure out which one of the four statements about images and set operations is incorrect and correct it).

Mon., 9/12
Four statements about about images and set operations:
   \[ f(U_1 \cup U_2) = f(U_1) \cup f(U_2) \] and so on

Wed., 9/14
Composition of maps
Inverse map
Cancellation equations
2\(^s\) notation
Direct and inverse image as maps
Fri., 9/16
Finite sets
Pigeonhole (Dirichlet Box) principle
Two sets have the same cardinality: meaning and notation
Countable sets

Mon., 9/19
Equivalence relation

Wed., 9/21
Equivalence class
Equivalence class of an element
Statement of the Equivalence Relation Theorem

Fri., 9/23
Principle of Mathematical Induction
Principle of Mathematical Induction, Strong Form
Well Ordering of \( \mathbb{N} \)

Mon., 9/26
No quiz

Wed., 9/28
Axioms of \( \mathbb{R} \)
Upper bound, bounded above sets
Supremum (least upper bound)
Open and closed intervals, their suprema

Fri., 9/30
Infimum and supremum of unbounded and empty sets
Archimedean Property of \( \mathbb{R} \)
\( sup(\mathbb{N}) = +\infty \)

Mon., 10/03
Density Theorem
\( [x] \)
Wed., 10/05
Triangle Inequality, Generalized Triangle Inequality.
Arithmetic Mean of $x_1, \ldots, x_n$
Geometric Mean of $x_1, \ldots, x_n$ ($x_i \geq 0$)
Arithmetic-Geometric Mean Inequality.

Fri., 10/07
$\lim_{x \to a} f(x) = L$

Tue., 10/11
Nested Intervals.
Nested Intervals Property.

Wed., 10/12
Open subsets of $\mathbb{R}$.
Closed subsets of $\mathbb{R}$.

Fri., 10/14
$\lim_{n \to +\infty} a_n = L$
$\lim_{n \to +\infty} a_n \neq L$

Mon., 10/17
Bounded sequences.
Convergent sequences are bounded.
Limit Laws for sequences.

Wed., 10/26
Increasing, decreasing, strictly increasing, strictly decreasing sequences.
Monotone Convergence Theorem.

Fri., 10/28
Subsequences.
Monotone Subsequence Theorem.

Mon., 10/31
Bolzano-Weierstrass Theorem.
Wed., 11/02
Cauchy sequences.
Cauchy convergence criterion.
Bolzano-Weierstrass Theorem.
Subsequences.
Monotone Subsequence Theorem.

Wed., 11/09
Limit of a function.
Continuous functions.
Existence of maximum for a continuous function on a segment.
Intermediate Value Theorem.
Definition of a sum of an infinite series.

Wed., 11/16
The Divergence Test.
Convergence of a series only depends on its tail.
Sum of a positive series as a supremum.
Independence of the sum of positive series on the order of summation.
Direct Comparison Test.
Limit Comparison Tests.
Cauchy Condensation Theorem