

**MATH 444
STUDY GUIDE
MIDTERM 1**

The exam covers all of the material we have discussed, up to and including section 3.2 of the text. Some important concepts include:

Ch. 1: Sets, union, intersection, complement, functions, properties of functions (bijective, invertible, injective or 1-to-1, surjective or onto), image, preimage, inverse function, induction, strong induction, properties of sets (finite, infinite, countable, denumerable, uncountable)

Ch. 2: Algebraic properties of \mathbb{R} (2.1.1), Order properties of \mathbb{R} (2.1.5), absolute value, ε -neighborhood $V_\varepsilon(x)$, bounded sets, upper/lower bounds, infima/suprema, Completeness property of \mathbb{R} (2.3.6), intervals (closed, open, half-closed)

Ch 3: Sequence, tail of sequence, convergent/divergent sequence, limit of convergent sequence, bounded sequence

The following are some of the more important results in the course, and you should be familiar with their statements:

Ch. 1: \mathbb{Q} is a denumerable set(1.3.11), Equivalent ways to show a set is countable (1.3.10)

Ch. 2: The existence of irrational numbers (2.1.4), Theorem 2.1.9, Triangle inequality (2.2.3 and 2.2.4), Equivalent ways to show u is a supremum (Lemmas 2.3.3 and 2.3.4), Archimedean Property of \mathbb{N} (2.4.3 and 2.4.5), Density of rationals and irrationals in \mathbb{R} (2.4.8 and 2.4.9), Nested Intervals Theorem (2.5.2), \mathbb{R} is uncountable (2.5.4)

Ch. 3: Equivalent ways to describe convergence (3.1.5), Convergent sequences are bounded (3.2.2), Algebraic manipulation of limits (3.2.3), the Squeeze Theorem (3.2.7)

Some Suggested Exercises from the Text

1.1: 3, 13, 20

1.2: 4, 8, 13

1.3: 3, 10, 11

2.1: 1(a,c), 6, 16(a,c), 20

2.2: 3, 6, 10

2.3: 6, 9

2.4: 2, 4(a), 9, 13

2.5: 1, 2, 8

3.1: 6, 9, 15

3.2: 6, 9, 18(a,c), 21

Date: September 17, 2010.