

### Topics for Exam 1

#### 1. Logic and Proofs

- 1.1 Logical connectors, negation, and implications.
- 1.2 Quantifiers.
- 1.3 Methods of proof.

#### 2. Sets of Numbers

- 2.1 Natural numbers, well-ordered sets and the principle of induction.
- 2.2 Integers and divisibility.
- 2.3 The rational numbers.
- 2.4 The real numbers.

#### 3. Axioms of the Real Numbers

- 3.1 Field axioms.
- 3.2 Order axioms
- 3.3 Completeness axiom.

#### Relevant chapters and sections in the text:

Sections 1.3, 1.4, 4.3, 4.5, 3.1, 3.2, 4.6, 4.7 and Chapter 5.

#### Relevant Handouts:

Handouts 1 and 2.

#### Relevant Assignments:

Assignments 1 through 6.

#### Relevant Problem Sets:

Problem Sets 1 through 4.

#### Important Concepts:

Logical equivalence, least upper bound or supremum, greatest lower bound or infimum, the Archimedean Property.

#### Important Skills:

Know how to prove mathematical statements. Know how to use mathematical induction to prove statements involving the natural numbers. Know how to compute suprema and infima of bounded subsets of real numbers.