Tentative Outline

Chapter 1: Speaking Mathematically
1.1: Variables
1.2: The Language of Sets

Chapter 2: The Logic of Compound Statements
2.1: Logical Form and Logical Equivalence
2.2: Conditional Statements
2.3: Valid and Invalid Arguments
2.4: Application: Digital Logic Circuits
2.5: Application: Number Systems and Circuits for Addition

Chapter 3: The Logic of Quantified Statements
3.1: Predicates and Quantified Statements I
3.2: Predicates and Quantified Statements II
3.3: Statements with Multiple Quantifiers
3.4: Arguments with Quantified Statements

Chapter 4: Elementary Number Theory and Methods of Proof
4.1: Direct Proof and Counterexample I: Introduction
4.2: Direct Proof and Counterexample II: Writing Advice
4.3: Direct Proof and Counterexample III: Rational Numbers
4.4: Direct Proof and Counterexample IV: Divisibility
4.5: Direct Proof and Counterexample V: Division into Cases and the Quotient-Remainder Theorem
4.6: Direct Proof and Counterexample VI: Floor and Ceiling
4.7: Indirect Argument: Contradiction and Contraposition
4.8: Indirect Argument: Two Famous Theorems
4.10: Application: Algorithms

Chapter 5: Sequences, Mathematical Induction, and Recursion
5.1: Sequences
5.2: Mathematical Induction I: Proving Formulas
5.3: Mathematical Induction II: Applications
5.4: Strong Mathematical Induction and the Well-Ordering Principle for the Integers

Chapter 6: Set Theory
6.1: Set Theory: Definitions and the Element Method of Proof
6.2: Properties of Sets
6.3: Disproofs and Algebraic Proofs

Chapter 7: Properties of Functions
7.1: Functions Defined on General Sets
7.2: One-to-One, Onto, and Inverse Functions
7.3: Composition of Functions
7.4: Cardinality with Applications to Computability

Additionally, we will include selected material from the following chapters as time permits:

- Ch. 8: Properties of Relations
- Ch. 9: Counting and Probability
- Ch. 10: Theory of Graphs and Trees