

The purpose of this handout is to help you study by listing the concepts, definitions, and results you will need to know for the mid-term.

**Midterm Information.** The midterm will be on *Oct. 25, 2002* at 2:30. The midterm will take place in our regular class room. You will *not* be allowed to bring in any notes, use the text book, or use a calculator.

**Material Covered.** All the material discussed in class may appear on the midterm. The material that we covered was Chapter 1 and Chapter 2 of the text. I have given below a breakdown of what you will need to know from each section.

1. **Section 1.1** Know the definition of a proposition, the logical operators ( $\neg, \rightarrow, \wedge, \vee, \oplus$ ), how to construct truth tables, and how to turn propositions into English sentences, and back.
2. **Section 1.2** Know the definition of a tautology, contradiction, and the table of logical equivalences in Table 5 (page 17).
3. **Section 1.3** Know how to use the universal and existential quantifiers ( $\exists, \forall$ ). Also know how to turn expressions using quantifiers into English sentences, and back.
4. **Section 1.4** Know the definitions of a set, a subset, the cardinality of a set. Also know how to form the power set of a set, and how to make the Cartesian product of two or more sets.
5. **Section 1.5** Know how to use the the various set operations ( $A \cup B, A \cap B, A - B, \overline{A}$ ). Also know how to prove set identities using a membership table.
6. **Section 1.6** Know the following terms related to functions: co-domain, domain, range, image. Know the difference between a one-to-one function and an onto function. Also know how to construct a one-to-one and/or onto function. Know what the inverse of a function is. You should also be able to use the floor and ceiling function.
7. **Section 1.7** You should know what a sequence is, and how to find the next term in a simple sequence. You should also be familiar with the summation notation described in this section.
8. **Section 1.8** Know the definition of “big-O” notation, and be able to use Theorem 1 (page 84) to compute big-O of some polynomial functions.
9. **Section 2.1** Know how to write simple algorithms like the ones we did in class. You should also be able to write down the various steps of an algorithm, like some of the homework problems.
10. **Section 2.2** Know how we measure the time complexity of an algorithm.
11. **Section 2.3** You will need to know the definitions of the following terms:  $a$  divides  $b$ , factor, multiple, prime, gcd, lcm,  $a \bmod m$ ,  $a$  congruent modulo  $m$ . You will also need to be able to compute the gcd and lcm of two numbers. As well, you should be able to calculate  $a \bmod m$ .
12. **Section 2.4** You only need to know the material on the Euclidean Algorithm. As well, you should be able to apply the Euclidean Algorithm.
13. **Section 2.5** Know what a linear congruence is, and how to calculate some simple congruences. Also know how to apply the Chinese Remainder Theorem. You don't need to know the proof, but how to apply the result. Since we have not had a homework assignment on this section, I will pick one question from among the following list: Section 2.5 Exercises 11, 12, 21, 22.