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

MIDTERM INFORMATION. The midterm will be on Wednesday, February 14, 2007 during our regular class time. You will NOT be allowed to bring in any notes, use the text book, or use a calculator.

MATERIAL COVERED. The exam will cover all the material discussed in class about Section 3.8, Chapters 6, 7, and 8. The exam will not explicitly test you about the material covered in the last exam.

I have given a breakdown of what you will need to know from each section.

(1) SECTION 3.8 Know how to multiply matrices together. Also know what is meant by the identity matrix, the transpose, and a symmetric matrix. As well, you should know how to use the Boolean operators $\wedge$ and $\vee$, and how to take the Boolean product of two zero-one matrices.
(2) SECTION 6.1 Know the definition of an experiment, sample space, event, and probability. You should also be able to calculate some probabilities, like questions involving poker hands. As well, you should know Theorems 1 and 2 about the probability of combinations of events.
(3) SECTION 6.2 Be able to assign probabilities, like Example 1. Know Definition 2, and how to use it to compute the probability of an event. Also, know how to compute the conditional probability of an event, and know what it means for two events to be independent. As well, know what a Bernoulli trial is and its formula (Theorem 2). You can ignore the material on random variables and the material after this subsection.
(4) SECTION 6.3 Know Bayes's Theorem (Theorem 1) and how to use it. Be able to do problems like Examples 1 and 2. You can omit the material on Bayesian spam filters.
(5) SECTION 7.1 Know the definition of a recurrence relation, and be able to determine if a sequence is a solution of a recurrence relation. Furthermore, you will need to know how to do problems like Example 6, that is, how to find recurrence relations for specific problems. You will also need to know how to use the iterative approach (as in Example 3).
(6) SECTION 7.2 In this section, you will only need to know all the material up to, and including Example 5. You can ignore the rest of the section. Make sure you know how to solve recurrence relations using Theorem 1 and Theorem 2.
(7) SECTION 7.4 Know what a generating function is, and how to take a sequence and determine its generating function in its closed form. As well, you should be able to go from the generating function to the sequence. You do not need to memorize the table on page 489 – I will provide you with necessary formulas. Also, know how to use generating functions to solve counting problems like we did in class.
(8) SECTION 7.5 Know the Principle of Inclusion-Exclusion, and how to use it.
(9) SECTION 7.6 Be able to use the Principle of Inclusion-Exclusion to solve problems like we did in class and in the homework.
(10) SECTION 8.1 You will need to know the definition of a relation. You will also be required to know the definitions for reflexive, symmetric, antisymmetric, and transitive. In particular, you should be able to identify which properties a relation has. You will also need to know how to combine relations, as well as the definition of a composite of two relations.
(11) SECTION 8.2 Know what a n-ary relation is, and what the projection map is.
(12) SECTION 8.3 You should be able to associate to a relation a zero-one matrix. Moreover, you should be able to describe how we can use a matrix to determine if a relation is reflexive, symmetric, antisymmetric, or transitive. You will also be required to know how to use the matrices of two relations R_1 and R_2 to find the matrices associated to the relations $R_1 \cap R_2$, $R_1 \cup R_2$, and $R_2 \circ R_1$. We also need to know how to associate to a relation a digraph.
(13) SECTION 8.4 Given a relation, you should be able to find its reflexive closure, its symmetric closure, and its transitive closure.
(14) SECTION 8.5 Know the definition of an equivalence relation, as well as an equivalence class. Be able to do problems like those assigned for homework. Know what a partition is.
(15) SECTION 8.6 Know the definition of a partial order, poset, and total order. You should know some examples of each type of ordering. As well, you will need to now how to use lexicographic ordering. Also know how to construct a Hasse Diagram.