Math 1271/3071 Midterm I Info Sheet

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 first midterm will be on Friday Oct. 14, 2011 at 8:30AM. The midterm will take place in our regular class room and will be 50 minutes long. You will *not* be allowed to bring in any notes, use the text book, or use a calculator. Please bring your **Student Card**.

Material Covered. All the material discussed in class may appear on the midterm. The material that we covered was Chapters 1 to 3. Below, I have given a breakdown of what you will need to know from each section.

(1) **Section 1.1** Know the definitions of a set, element, member, subset, prime number, common divisor, greatest common divisor, divisor, factor (also be able to give examples of all terms). Also know what elements are in the following sets: $\mathbb{Z}^+, \mathbb{Z}, \mathbb{Q}, \mathbb{R}$. You should also know the properties of exponents and logarithms, as well as the ceiling and floor function.

(2) **Section 1.2** Know how to use the summation notation, how to evaluate sums, and know the properties of sums.

(3) **Section 1.3** Know how to change numbers from one base to another.

(4) **Section 1.4** Know how to express numbers in scientific notation. Know the terms mantissa, exponent, and fraction. You should also know how to write a number using floating point notation, and how to properly round a number.

(5) **Section 1.5** You do not need to know anything from this section.

(6) **Section 2.1** Know the definitions of proposition, truth value, simple proposition, and compound propositions. Know the simple connectives, i.e, $\sim, \vee, \wedge, \rightarrow, \leftrightarrow$, including their truth tables. Be able to find truth tables of compound propositions. Know the terms tautology and contradiction. In addition, know the laws of logic on page 35 and 36 (including De Morgan's Law).

(7) **Section 2.2** Know what we mean by the empty set and the power set. Understand how to use the four set operations: union, intersection, relative complement, and the complement. Know what is meant by two sets being disjoint. Also know the properties of set operations (see page 41).

(8) **Section 2.3** Be able to use either a membership table or a Venn Diagram to prove a set identity.

(9) **Section 2.4** Know how to form either the set difference and the Cartesian product.

(10) **Section 2.5** Know the principle of mathematical induction. Know the different flavours of induction (e.g. strong induction). You will be asked at least one question that will need induction.

(11) **Section 3.1** Know terms like binary operation and unary operation. Know the properties of a Boolean algebra. (We will restrict to the case that our Boolean algebra is the set $\mathcal{B} = \{0, 1\}$.) Know the binary operations of $+, \times$, and $'$. Know how to take the complement, and know the laws, like De Morgan's Laws.

(12) **Section 3.2** Know what a Boolean expression is. Know what we mean by a literal, a fundamental product, disjunctive form, and a minimal disjunctive form. Be able to rewrite Boolean expressions in a disjunctive form.

(13) **Section 3.3** Know how to use a Karnaugh map to simplify a Boolean expression.

(14) **Section 3.4** Know the three basic digital circuits: the AND gate, the OR gate, and the NOT gate. Be able to determine a Boolean expression from a given digital circuit, and vice versa. Know how to use a half adder and full adder to do binary addition.

If you have questions, please feel free to email me. Good luck!