Math 1030 – Spring 2008
Review Sheet for Exam #1

The first exam is on Friday, March 14th during class time. For this exam, you are responsible for Chapter 1 and Sections 2.1 - 2.4, 3.1 of the text, as well as the in-class worksheets we have done. You may bring a nonprogrammable, non-graphing calculator and something to write with. No notecards or other aids are allowed.

To study for the exam, I recommend starting with the basic (meaning essential) ideas from the course so far. Make sure you understand all definitions, formulas, and facts we have covered. Once you have done that, work through the quiz and homework problems and review the concepts behind any exercises which give you trouble. Below is a list of topics that are fair game for the exam.

If you have questions or need help, come see me ASAP. Good luck!

Chapter 1: Introduction to Problem Solving

- What are Pólya's principles of problem solving?
- Be able to apply various strategies to solve different types of problems considered in this chapter. Some of these strategies include guess-and-check, making lists/tables, drawing pictures, using equations and/or variables, recognizing patterns, working backwards, and solving a simpler problem. Consult the textbook and worksheet 1 for examples and more strategies.
- What is a triangular number? rectangular number? Be able to solve problems using these. (See the homework.)

Section 2.1: Sets as a Basis for Whole Numbers

- Definitions: set, element, set-builder notation, equal sets, equivalent sets (one-to-one correspondence), universal set, complement, subset, proper subset, intersection, union, the empty set, Venn diagram, difference of sets, Cartesian product of two sets, finite set, infinite set.
- Be able to write a set by using a word description, listing the elements inside braces, and applying set-builder notation.
- Given some sets, be able to construct, understand, and use a Venn diagram. Know how to identify regions in a Venn diagram.
- Given some sets, be able to compute the complement, union, intersection, difference, and Cartesian product of various sets. Know also how to describe sets that use combinations of these.
- You should know how to tell if two sets are equal or if one set is a subset (or proper subset) of another set.
- How can you tell if two sets are equivalent?

Section 2.2: Whole Numbers and Numeration

- Definitions: cardinal number, ordinal number, identification number, $n(A)$, cardinality of a set, "less than" and "greater than" (in terms of sets), positional numeration system, placeholder, place value.
- Be able to determine if a number is cardinal, ordinal, or identification.
- Know how to compute the cardinality of a finite set and to determine if two sets are equivalent.
- You should know how to determine how whole numbers are ordered by the use of sets (see the definition on page 61).
- Be able to tell me what is the set of whole numbers.
- If I give you an ancient numeration system with its symbol key (for example, Egyptian, Roman, Mayan, Babylonian, etc.), be able to use the system to write a decimal number in terms of these symbols and vice-versa. You do not need to memorize the numeration systems given in Section 2.2, although a basic understanding of them will be helpful. (I will not ask you to translate a number into or out of the Mayan system.)

Section 2.3: The Hindu-Arabic Numeration System

- Definitions: Hindu-Arabic numeration system, expanded form of a number, chip abacus, base $n$ numeral.
- What is the Hindu-Arabic numeration system? What is its base? Is it positional?
- How do you write the expanded form of a numeral?
- You should know how to convert a base 10 numeral into another base, and vice-versa. This can be done by using a chip abacus, block representations (units, rods/longs, flats, and blocks), expanded forms of numerals, or long division.

Section 2.4: Relations and Functions

- Definitions: relation, function, arithmetic sequence/progression, common difference, geometric sequence/progression, common ratio, domain, codomain.
- What is a relation? What are some of the ways we discussed in class in which a relation can be represented?
- Skip the subsections on the reflexive, symmetric, and transitive properties.
- What is a function? What are some of the ways we discussed in class in which a function can be represented? Be able to use function notation also.
- How is a function different from a relation? How are they similar?

- What is an arithmetic sequence? geometric sequence? How are they similar/different? Know how to identify arithmetic and geometric sequences, and be able to use them in problems. Also know how to write the formula for an arithmetic and geometric sequence.
- What is the domain of a function? What is the codomain of a function? Be able to identify these if I give you a function.

Section 3.1: Addition and Subtraction of Whole Numbers

- Definitions: sum, addend, difference, minuend, subtrahend, missing addend.
- Be able to demonstrate addition of two whole numbers with any model we covered in class (set model, measurement model, Cuisenaire rods, etc.).
- Know the four properties of whole number addition: closure, commutativity, associativity, and identity. Be able to use and illustrate these properties in problems.
- You should be able to demonstrate subtraction of two whole numbers with any model we discussed in class (set models, measurement models, comparison models, etc.).
- Be able to show that the four properties of whole number addition do not hold in whole number subtraction.
- Using the techniques of this section, you should know how to perform addition and subtraction of small numbers in bases other than 10.