The exam will cover sections 1.1-4.3 and 7.1-7.3 from your text book. In preparing for the exam, you should look at your lecture notes and textbook, returned homework, and to a lesser extent, your lab notebook.

Here are some of the main points which you should review as you prepare for the exam.

1. Chapter 1: Foundations for Learning Mathematics
   (a) Know how to apply the formula \(1 + 2 + \ldots + n = \frac{n(n+1)}{2}\).
   (b) Be able to recognize patterns and use other problem solving techniques as seen in your homework.
   (c) Apply the rules of deductive reasoning and tools such as Venn diagrams to determine if an argument or statement is correct.

2. Chapter 2: Fundamental Concepts
   (a) Be able to describe sets using words, listing the elements, or by using set-builder notation.
   (b) Use Venn Diagrams and set operations (i.e. \(\cup\) and \(\cap\)) to describe subsets.
   (c) Use Venn Diagrams as a counting tool as seen in class and on your homework.
   (d) Describe a function relation using tables, graphs, or formulas.
   (e) Use a graph or a formula to evaluate a function at a given independent variable value.
   (f) Compare functions to choose the “best” one in a particular situation.
   (g) Know the symbols for the Egyptian, Roman, and Babylonian numeration systems up to 100 and be able to write numerals with values up to 999 using these systems.
   (h) Represent values in different bases using either numerals or base-\(n\) block pictures.
   (i) Convert between two bases (converting to base 10 first is ok).

3. Chapter 3: The Four Fundamental Operations
   (a) Model addition using pictures or base 10 blocks.
   (b) Perform and describe the standard addition algorithm as well as the “scratch” and “lattice” addition algorithms in bases up to 10.
   (c) Describe strategies for “mental” addition.
   (d) Model subtraction using pictures or base 10 blocks.
   (e) Perform and describe the standard subtraction algorithm as well as the “Australian” algorithm in bases up to 10.
   (f) Model multiplication using pictures or base 10 blocks.
   (g) Perform and describe the standard multiplication algorithm as well as the “lattice” and “Russian Peasant” algorithms in bases up to 10 (for bases other than 10, a multiplication table will be given).
   (h) Describe strategies for “mental” multiplication.
   (i) Model division using pictures or base 10 blocks either as repeated subtraction or partitioning.
   (j) Perform and describe the standard division algorithm as well as the scaffolding algorithm.

4. Chapter 4: Number Theory
   (a) Be able to recognize: prime numbers, composite numbers, when a number a “divides” a number b, and other properties of divisibility.
   (b) Know the divisibility tests for the numbers 2 through 10 in base 10, except for seven. Be able to perform and model theses tests.
(c) Be able to define and identify deficient, perfect, and abundant numbers.

(d) Write any integer as a product of primes, and use the prime factorizations to find: Greatest Common Factors and Least Common Multiples.

(e) Model the concept of Greatest Common Factor and Least Common Multiple in some valid way, and know the connection between them.

(f) Basic modular or “clock” arithmetic problems as seen in class.

5. Chapter 7: Data and Chance

(a) Be able to read line, bar, and pie graphs.

(b) Recognize when one graph type is more appropriate than the others.

(c) Be able to construct and recognize valid line, bar, and pie graphs.

(d) Calculate the mean and standard deviation of a small set of numbers.

(e) Calculate the five-number summary for a small set of numbers.

(f) Draw a box-plot, stem-plot, and/or frequency distribution.

(g) Use the “68-95-99.8” rule to work with normal distributions.

(h) Be able to calculate probabilities for events as seen in class.

(i) Find the expected value of a simple game as seen in class.