Math 102
Exam 2 Review Sheet

Section 13.1: Introduction to Counting Methods

Key Topics:
• Counting by making a list.
• Counting using tree diagrams.

Section 13.2: The Fundamental Counting Principle

Key Topics:
• Using the Fundamental Counting Principle to count a task that can be broken into a several steps. (multiply the number of ways of doing each step)
• Using "Slot Diagrams" to organize information in a counting problem.
• Counting situations involving extra conditions or restrictions.

Section 13.3 Permutations and Combinations

Key Topics:
• Know the definitions of permutations and combinations, and how to determine whether a given example is a permutation, a combination, or neither (hint: in permutations, order matters)
• Memorize and be able to apply the counting formulas for both permutations and combinations:

$$P(n,r) = \frac{n!}{(n-r)!} \text{ and } C(n,r) = \frac{n!}{r!(n-r)!}$$

• Be able to apply *one or more* counting method(s) to count the number of possibilities in a given situation. Also be able to account for extra restrictions on which choices are possible based on either stated conditions or facts about the underlying situation.

Section 13.4: Counting and Gambling

Key Topics:
• Memorize the the basics of how a deck of cards is put together (52 cards, 4 suits) and be able to count the number of ways a given poker hands can occur.
• Be able to solve more general counting problems involving playing cards, dice, or coins.
• Know how to count the ways of winning in a game of chance such as a slot machine.

Section 2.1 The Language of Sets

Key Topics:
• Know the definition of a set and how to represent a set verbally, in roster notation, and in set-builder notation.
• Understand the idea of well definedness and be able to determine whether a given set is well defined.
• Know the names and definitions of common numerical sets (natural numbers, whole numbers, integers, etc.).
• Know the definition of a universal set, the empty set, and a set of sets.
• Understand the notation: $\in$, $\notin$, and be able to find the cardinal number of a set A ($n(A)$)

Section 2.2 Comparing Sets

Key Topics:
• Know the definitions of equality of sets and equivalence of sets and understand the definition of a subset and a proper subset of a set.
• Be able to count the subsets of a set and be able to use Pascal's Triangle to find the number of subsets of a given size.

Practice Problems: Chapter 13 Test page 656-657 # 2, 4, 5, 6, 7, 8, 9, 12, 14, 16;
Practice Problems: Chapter 2 Test page 79-80 # 1, 2, 3, 5, 6, 7, 8, 9