Material To Review for Hour Exam #1

General Instructions

For each topic, review the material covered in class, problems on homework assignments #1, #2, #3, and #4, and related exercises in the textbook. If a topic is listed and I do not indicate that you should memorize it, then understand the topic and proof. When applicable, also review applications to coin tossing, dice rolling, and card games such as poker. All chapter, section, and page numbers refer to the 9th edition of the course text, *First Course in Probability* by Sheldon Ross.

Introductory material

a. Stirling's formula: **memorize** statement, no proof
b. Computing probabilities in the birthday problem and related problems

Chapter 1. Combinatorial Analysis

§1.2 The Basic Principle of Counting

a. The basic principle of counting on page 2
b. The generalized basic principle of counting on page 2
c. Examples

§1.3 Permutations

a. **Memorize** definition and formula on page 3
b. Examples

§1.4 Combinations

a. **Memorize** definition and formula on page 5
b. Examples
c. Binomial theorem on page 7: **memorize** statement, no proof

§1.5 Multinomial Coefficients

a. **Memorize** definition and formula on page 10
b. Examples

Chapter 2. Axioms of Probability

§2.2 Sample Space and Events

a. Definitions and basic properties on pages 22–23
b. Use of Venn diagrams on pages 23–24
c. DeMorgan's laws on page 25: statements and proofs
d. Examples

§2.3 Axioms of Probability

a. **Memorize** Axioms 1, 2, and 3 on page 26
b. Examples

§2.4 Some Simple Propositions

a. Proposition 4.1 on page 28: statement and proof
b. Proposition 4.2 on page 28: statement and proof
c. Proposition 4.3 on pages 28–29: statement and proof
d. Examples

§2.5 Sample Spaces Having Equally Likely Outcomes

a. **Memorize** formula for $P(E)$ on page 32

b. Examples

Chapter 3. Conditional Probability and Independence

§3.2 Conditional Probabilities

a. **Memorize** definition on page 57: $P(E|F) = \frac{P(E \cap F)}{P(F)}$ if $P(F) \neq 0$.

b. Value of $P(E|F)$ in each of the following cases: (i) E and F are independent, (ii) E and F are disjoint, and (iii) F is a subset of E (done in class)

c. Examples

§3.3 Bayes's Formula

a. Formulas for $P(E)$ in equation (3.1) on page 62: **memorize** these formulas and their proofs

b. Two forms of Bayes's formula given in class: **memorize** both formulas and their proofs

c. Proposition 3.1 on page 69 for general n

c. Examples

§3.4 Independent Events

a. **Memorize** definition for 2 events on page 75: $P(E \cap F) = P(E) \cdot P(F)$.

b. Proposition 4.1 on page 76: statement and proof

c. **Memorize** definition for 3 events on page 77

d. Examples