Review for Exam 1

Chapter 1

1. Be able to determine the sample space, outcomes and event(s) from a given situation and be able to write the event in symbols and words.

2. Set Theory: be able to use set theory notation.

3. Set Theory: Be able to determine the union, intersection, compliment, setminus and combinations of events. These include de Morgan’s laws, associative, distributive and commutative properties and the null set.

4. Set Theory: Be able to draw Venn Diagrams of union, intersection, compliment, subsets, etc for sets or events.

5. Be able to write sets in words (English).

Chapter 2

6. Be able to state the frequentist interpretation of probability in words and calculate the appropriate probability.

7. Determine if two events are disjoint.

8. State and use the three probability axioms. There may be proofs using these axioms on the exam. If there are proofs, I will tell you which theorems you can use. You may state a theorem by its name (description).

9. Be able to use: \( P(\emptyset) = 0 \)

10. Determine if a listing of numbers is a legitimate probability.

11. Be able to create and show that a set of events is a partition.

12. Determine if a situation utilizes the equal likelihood assumption for finite or infinite sample spaces.

13. Determine probabilities using the equal likelihood assumption.

14. Determine if a situation utilizes empirical probabilities.

15. Determine if a situation utilizes subjective probabilities.

16. Be able to use the basic properties of probability to calculate probabilities:
   a) Domination principle
   b) Complementation Rule
   c) Inclusion – Exclusion Principle

Chapter 3

17. Be able to determine if two (or more) events are independent using \( P(A \cap B) = P(A)P(B) \)
   a) subsets are dependent
   b) complements are dependent

18. Be able to determine if two events are independent using \( P(A|B) = P(A) (P(B|A) = P(B)) \).
19. Be able to differentiate between (mutual) independence and pairwise independence.

20. Be able to differentiate between independent events and disjoint events.

21. Be able to use the concept of independent events to calculate probabilities.

22. Be able to determine the probability of good before bad (Th. 3.24).

**Chapter 4**

23. Be able to determine what is given in a problem involving conditional probabilities and/or intersections. (Also in Chapter 5).

24. Be able to calculate conditional probabilities using the definition of conditional probability.

25. Be able to use the fact that a conditional probability follows the probability axioms.

**Chapter 5**

26. Be able to calculate a probability using a partition.

27. Be able to determine when to use Bayes’ Theorem and which form to use.

28. Be able to use Bayes’ Theorem to calculate conditional probabilities.

29. Be able to calculate intersections by using the general multiplication rule. (Also in Chapter 4)

30. Be able to use the Pólya's urn situation.

31. Be able to calculate probabilities using circuits in series, or parallel, or a combination of the two.