PSTAT 120A: Rough Overview of Pre-Midterm Topics

1 Axioms of Probability; Counting

Corresponding Textbook Sections: §1.1 - 1.4; Appendices B and C

- Experiment; outcome space, event space

- Probability measures; axioms of probability

- Probability Space

- Fundamental Principle of Counting

- Slot Diagram/Slot Method

- $(n)_k$, $\binom{n}{k}$

- Basic Set Theory: union, intersection, complement, set difference, Cartesian Product, cardinality; disjoint; DeMorgan's Laws; partitions

- Classical Definition of Probability (Equally Likely Outcomes)

2 Conditional Probability and Independence

Corresponding Textbook Sections: §2.1 - 2.3, 2.5

- Definition and interpretation of conditional probability

- Definition and interpretation of independence of two events

- Mutual independence; pairwise independence; conditional independence

- Law of Total Probability

- Bayes' Theorem/Rule

3 Random Variables

Corresponding Textbook Sections: §1.5; 3.1 - 3.4

- Definition of a random variable

- State Space

- Classification of random variables (discrete vs. continuous)

4   Distributions (Discrete and Continuous)

Corresponding Textbook Sections: §2.4; Chapter 3; 4.4 - 4.6

- Conceptual definition of a distribution

- Probabiliy Mass Function (p.m.f.); Probability Density Function (p.d.f.)

- Cumulative Mass Function (c.m.f.); Cumulative Distribution Function (c.d.f.)

- Expectation; moments; variance

- Bernoulli Distribution; Geometric Distribution; Negative Binomial Distribution; Discrete Uniform Distribution; Hypergeometric Distribution; Poisson Distribution

- Poisson Point Process; interarrival times

- Uniform Distribution; Exponential Distribution; Gamma Distribution; Normal Distribution