

## Exam 1 Review

### Chapter 2

- union, intersection, complement, null set
- Distributive Laws, DeMorgans Laws
- Kolmogorov Axioms of Probability, Sample space
- Complement rule,  $P(\emptyset) = 0$ , Monotonicity property (Page 6),  $0 \leq P(A) \leq 1$ , Inclusion-exclusion
- Probability calculation,  $P(A) = \sum_{i: E_i \in A} P(E_i)$  (Page 9), Meaning of equally likely
- The multiplication rule for counting, Permutations, Combinations
- Conditional probability, Multiplication Law of Probability, Independence, Law of Total Probability, the meaning of Partition, and Bayes Rule.

### Chapter 3

- Definition of random variables, Support of a random variable
- Discrete random variable  $Y$ , Probability mass function of  $Y$  (what is a valid pmf?)
- Mathematical Expectation of a discrete random variable  $Y$ , of  $g(Y)$ , of  $cg(Y)$ , of  $\sum_{j=1}^k g_j(Y)$ , of  $aY + b$ .
- Variance of  $Y$ , of  $aY + b$ .
- How to calculate the moment generating function of a discrete random variable. How to use mgf to compute the  $k$ th moment (you should know how to take derivatives).
- Binomial distribution, pmf of  $b(n, p)$ , mgf of  $b(n, p)$ , mean and variance of  $b(n, p)$ , how to compute probabilities.