

## Midterm

Date and time: Wednesday April 20, 10am-10:50am. Be on time! The exam starts at 10am sharp.

Location: here (Cubberley Auditorium).

Format: probably 5 problems.

Scope: all material so far, up to and including today's lecture. This means chapters 1-3 from the book, and chapter 4.1.

Bring: a calculator (you will need it!). No other aids will be allowed.

## Some Things to Know for the Midterm

1. Basic concepts: experiment, outcome, sample space, event, distribution, random variable.
2. Types of sample spaces: discrete finite, discrete infinite, continuous.
3. Basic random objects: coin, die, box, pack of cards.

3. Uniform distribution (discrete and continuous).
4. Continuous random variables. Density and CDF. How to compute some simple distributions (e.g. the density of  $X+Y$  where  $X, Y$  are both uniform on  $[0,1]$ .)
5. Plotting the distribution of a random variable (discrete and continuous).
6. Examples of computations in continuous spaces: Buffon's needle and Bertrand's paradox.

7. Methods for computing discrete probabilities: counting, the table method, the tree method.

8. Counting some basic objects: permutations, subsets, combinations, poker hands. Distinguish between ordered vs. unordered, repeats allowed vs. not allowed.

9. Stirling's formula.

10. Binomial coefficients and their properties: the recurrence formula, Pascal's triangle, Newton's binomial formula.
11. Bernoulli trials and the binomial distribution.
12. Basic hypothesis testing.

13. Conditional probability: Bayes' formula and using it in practice.

14. Independence.

15. Bayesian updating.