CSE 312 Midterm Notes

- Wednesday, February 10 (in lecture)
- Bring **calculator,** handwritten 2-sided note sheet, pencil/pen, eraser, student ID
- We will probably hold a review session on either Sunday or Tuesday: check your email

Study suggestions

- Go through lecture notes, and write down important theorems/concepts on note sheet
  - If your notes aren't clear, check out previous quarter's slides or the textbook for alternative explanations (both linked from course webpage)
  - If you were absent for any lectures, ask a friend or email the course staff for notes.
- **Do lots of practice problems**. Do as many past worksheet problems as you can.
- After studying, test yourself by doing the practice midterms we have created.
- **Please ask your peers or the course staff if you're confused about anything!**
  - Post on the discussion board, or email the course staff. We want you to do well!

Rough list of topics

Counting

- Product rule
- Permutations
  - K-permutations
  - Understand "with vs. without replacement" (whether repeats are allowed)
- Combinations
  - Binomial Theorem
- Complementing
- Inclusion-exclusion
- Pigeonhole principle

Probability

- Basic axioms
- Equally-likely outcomes
- Sample space and events
- Conditional Probability
- Law of Total Probability
- Bayes' Theorem
- Independent Events

Discrete random variables and expectation

- Definition of random variable
- Independence of random variables
- Probability mass function
- Definition of expectation

- Example: expectation of a **geometric random variable**
- Linearity of expectation
  - Indicator variables
- Variance
  - Definition
  - Theorem: $\text{Var}(X) = E[X^2] - (E[X])^2$
  - **If X & Y independent,** $\text{Var}(X + Y) = \text{Var}(X) + \text{Var}(Y)$
  - $\text{Var}(aX + b) = a^2 \text{Var}(X)$
- Distributions: Uniform, Bernoulli, Binomial, geometric
  - Know what situations they are used for, their probability mass functions, expectations, variances