

# FINAL EXAM INFORMATION

Math 262, Spring 2017

The final exam will occur on Friday, May 19 from 9am to 11am. The exam will also include a small take-home portion, distributed on the last day of class and due at the final exam session. The exam will be cumulative, with emphasis on the material from Chapter 4.

## Concepts and Theorems

*You should be able to define, illustrate, use, and briefly summarize the following:*

- sample space
- event
- probability (definition, 3 axioms)
- inclusion-exclusion principle
- fundamental principle of counting
- combination
- permutation
- selection with or without replacement
- counting when order does or does not matter
- conditional probability
- independent events
- law of total probability
- Bayes' rule
- discrete/continuous random variable
- probability mass/density function
- cumulative distribution function
- expected value, mean
- variance, standard deviation
- Chebyshev's inequality
- Bernoulli random variable
- binomial distribution
- geometric distribution
- negative binomial distribution
- Poisson distribution
- hypergeometric distribution
- uniform distribution
- normal distribution
- exponential distribution
- gamma distribution
- moment generating function
- joint distribution
- marginal distribution
- conditional distribution
- conditional expectation
- covariance, correlation
- independent random variables
- distribution function method (for finding the density of a function of rvs)
- transformation theorem (univariate and bivariate)
- Central Limit Theorem
- Law of Large Numbers

## In-Class

Books and notes will not be permitted during the in-class exam. Calculators will be allowed, but not necessary. You should know (from memory) the mean, variance, and probability

mass/density functions for the same distributions as on Exam 2 (binomial, geometric, Poisson, uniform, exponential, and normal distributions).

### **Take-Home**

For the take-home portion of the exam, you may use your textbook, your notes, the course web site, a calculator, *R*, *Mathematica* and *Wolfram Alpha*. Do not consult other sources, people, web sites, etc. Remember the honor code! The take-home exam will be due at the in-class exam on Friday, May 19.

### **Problems to Review**

*Consider the following problems for practice.*

- For each of the named distributions that we studied, what is something that can be modeled by a random variable of that distribution? What parameters are required to specify the distribution? What is the moment generating function?
- Make a list of key properties of moment generating functions. Why are they called “moment generating functions”?
- Work the *Transformations of Random Variables* problems found on the course web site.
- Work some of the *Supplementary Exercises* at the end of the chapters in the book, such as the following problems from Section 4.11: #154, **155**, 156, **157**, 158, 160, **161**, 164, **165**, 166, **167**, 168, **171**, 173, **175**, 177, **179**, 180, 181
- Review homework problems that you found to be difficult (solutions are on the course web site).