

Mathematics 375 – Probability and Statistics I
Review Sheet, Final Exam
December 8, 2003

General Information

The final examination for this course will be given at 2:30 a.m. on Thursday, December 18 in our regular class room, Swords 302. The exam will be roughly twice the length of one of the three midterms, but you will have the full three hour period from 8:30 am to 11:30 am to work on it if you need that much time. Like the second midterm, this will be an open book, open notes exam. Even more so than on that exam, of course, it will be necessary to prepare carefully even so; you do not want to be flipping through the book for every formula you need or similar examples to help you get started on every problem. There will not be enough time to complete the exam if you are doing that.

Topics to be Covered

- 1) Descriptive statistics such as the mean, standard deviation, frequency histograms, etc. The “empirical rule”.
- 2) Discrete sample spaces and counting techniques (especially in connection with the “sample point method” for the probability of an event): the $m \times n$ rule, permutations, binomial and multinomial coefficients.
- 3) The “event composition method” for probabilities
- 4) Conditional probabilities, independence of events, Bayes’ Rule, the Law of Total Probability
- 5) Discrete random variables: probability distribution functions, cumulative distribution functions, expected values and variances of functions of a discrete random variable, moment generating functions. Know the situations leading to binomial, geometric, Poisson, and hypergeometric random variables and how to apply them.
- 6) Continuous random variables: probability distribution functions, cumulative distribution functions, expected values and variances of functions of a continuous random variable, moment generating functions. Know the situations leading to uniform, exponential, gamma, beta, and normal random variables and how to apply them.
- 7) Tchebysheff’s Theorem.
- 8) Multivariate probability distributions: joint densities, marginal and conditional densities, expected values in this setting, conditions for independence, the covariance and the general formula for the variance of a linear combination of random variables.

Suggestions on How to Study

Start by reading the above list of topics carefully. If there are terms there that are unfamiliar or for which you cannot give the precise definition, *learn the definitions now; memorize them if you have to!* You simply cannot answer a question about this material if you do not know what the terms mean. Review the class notes. *Everything on the final will be similar to something we have discussed at some point this semester.* Also look back

over your graded problem sets and exams. If there are problems that you did not get the first time around, try them again now. Then go through the suggested problems from the three review sheets. If you have worked these out previously, it is not necessary to do them all again. But try a representative sample “from scratch” – don’t just look over your old solutions and nod your head if it looks familiar. You need the practice thinking through the logic of how the solution is derived again!

Suggested Review Problems

Look at the problems from the two previous review sheets for the topics from Chapters 1 - 4. From Chapter 5/11,27,28,57,58,59,61,84,96,120,121,122,123,125,133,134

Review Session

I will be happy to run a review session for the final exam during study week. We can discuss a time in class on Monday, December 8.