

MAIN TOPICS FOR EXAM 1

- (1) Fundamental definitions
 - (a) Discrete probability (including countably infinite sample spaces)
 - (b) Proofs of basic properties
 - (c) Uniform distribution
 - (d) Continuous random variables – density and cumulative distribution
 - (e) Connection with areas
 - (f) Uniform and exponential distributions
- (2) Simulations
 - (a) Random and pseudo-random numbers
 - (b) Monte Carlo algorithms
 - (c) Homework: reading a simple Java code fragment
- (3) Basic counting
 - (a) Permutations – $n!$
 - (b) k -subsets – $\binom{n}{k}$
 - (c) Binomial Theorem – $(x + y)^n$
 - (d) Inclusion/Exclusion
- (4) Binomial random variables
 - (a) Bernoulli processes
 - (b) Hypothesis testing – type I/II errors

Expect several True/False questions, followed by 2 other questions (possibly with multiple parts).

Use of notes, books, or calculators will not be permitted during the exam.