Math 30530, Fall 2015

Review for Exam 1

Exam 1 is Wednesday, September 23, in 112 Pasquerilla starting at 2 (the usual time) and tentatively ending at 3:10. Please note that this is **not** our regular classroom (it is the room we used at the beginning of the semester). There will be a review session Monday, September 21, at 7 p.m. in DBRT 125. Exam 1 will cover everything we have done in the first three chapters: Chapters 1 and 2 and §§3.1-3.2. On the exam you may use a summary (one side of an $8\frac{1}{2}'' \times 11''$ sheet of paper, with notes in your writing) and your own calculator (which you don't need for the exam). You may not use any device which can connect to the internet.

Here is an outline of most of the topics we've covered.

1. Probability

   - Sample space, random variable, events
   - Properties
     - $0 \leq P(A) \leq 1$
     - $P(\Omega) = 1$
     - If $A_1, A_2, \ldots$ are mutually exclusive $P(\cup A_j) = \sum P(A_j)$.
   - Discrete sample space, discrete random variable
     - Distribution functions
       * Uniform distribution
       * Binomial distribution
       * Infinite discrete sample spaces
   - Continuous sample space, continuous random variable
     - Density function
       * Uniform density function, uniformly distributed random variable
       * Exponential density
     - Cumulative distribution function
   - $P(\bar{A}) = 1 - P(A)$
   - Inclusion-Exclusion Principle, including the special case

$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

2. Computing probabilities

   - Sample spaces having equally likely outcomes
   - Using combinatorial analysis — discrete sample space

- Counting tasks carried out in stages
- Permutations
- Combinations
- Bernoulli trials

- Continuous case, uniform density
  - Thinking of probability as a length or area (divided by length or area of sample space)