Math 30530, Fall 2015

Review for Final

The exam is Wednesday, December 16, at 4:15 p.m. in 136 DeBartolo. There will be a review session Friday, December 11, at 2 p.m. in 231 Hayes-Healy.

The final will cover chapters 1,2,5,6,7,8,9 and §§3.1-3.2, 4.1-4.2, 10.1, 10.3. On the exam you may use a summary (both sides 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). I will provide the table for the normal distribution as part of the exam.

Here is an outline of the major topics we have covered. Topics marked with a † were covered after the material included on Exam 2.

- Probability

    - Sample space, random variable, events
    - Properties
    - Discrete sample space (possibly infinite), distribution functions
    - Continuous sample space, density function, cumulative distribution function
    - Inclusion-Exclusion Principle, including the special case

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

- Computing probabilities

    - Sample spaces having equally likely outcomes
    - Using combinatorial analysis — discrete sample space
    - Continuous case, uniform density
        * Thinking of probability as a length or area

- Random variables

    - Distribution function of a discrete random variable
    - Probability density function, cumulative distribution function of a continuous random variable
    - Specific types of random variables
        * Discrete
            · Bernoulli random variable
            · Binomial random variable
            · Poisson random variable
            · Geometric random variable
            · Negative binomial random variable
            · Hypergeometric random variables

- * Continuous
  - · Uniform density
  - · Exponential density
  - · Normal density
  - · Beta density
  - · Gamma density
- – Conditional probability
  - * Discrete and continuous cases
  - * Bayes' formula
  - * Independent events
  - * Joint distribution functions (discrete case)
  - * Joint density and cumulative distribution functions (continuous case)
  - * Independent random variables
  - * Independent trials process

- Functions of a random variable

- Expected value for discrete and continuous random variables

  - – Also called mean or expectation
  - – Conditional expectation

- Variance

  - – Standard deviation

- † Sums of independent random variables

  - – † Convolution of discrete probability distribution functions
  - – † Convolution of probability density functions

- † Chebyschev's inequality

- † Law of Large Numbers

- † Central Limit Theorem

- † Moments and moment generating function

  - – † Discrete random variables
  - – † Continuous random variables