Massachusetts Institute of Technology
Department of Electrical Engineering & Computer Science
6.041/6.431: Probabilistic Systems Analysis
(Spring 2006)

Week 7
March 20-24, 2006

Topics: Derived Distributions, Convolution, and Transforms

1. **Recitation 9: Tuesday, March 21**

   (a) Derivation of the PMF/PDF from the CDF

   (b) Derivation of distributions from convolutions (discrete and continuous)

2. **Recitation 10: Thursday, March 23**

   Transforms, properties, and uses.

3. **Tutorial 6: Friday, March 24**

   (a) Practice with transforms

   (b) Transforms of sums of random variables

   (c) Simple continuous convolution problem

4. **Problem Set 6 : Due April 5**

   (a) Standard transform inversion problem

   (b) Nice trick on discrete transforms

   (c) Simple calculation of a transform

   (d) Extended problem on using transforms to calculate moments and certain probabilities

   (e) Combines transforms with a generalization of the geometric random variable. May be a bit too grungy.

   (f) Practice manipulating the Gaussian pdf. Almost identical to a tutorial 5 problem, so it should be very easy for students.

   (g) Short proof using discrete convolution (basically just write down the definition)

   (h) Discrete convolution practice

   (i) Continuous convolution practice

   (j) Graduate problem - A classic which is very similar to problem 34 from chapter 3 in the book. If you haven't already done this problem with the grad students, it gives them an opportunity to either think creatively or do some simple integrals related to derived distributions.