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ECONOMICS 6331 – Probability and Statistics, Fall 2007

Homework 4. Wednesday September 26. Due Monday October 1.
(NOTE: The material for Moment Generating Function will be covered in make-up class Friday [bring the note on the MGF to class so you have the derivations without typos in front of you, we don't want to spend too much time on standard mathematical derivations].)

1. Ramanathan, Exercise 3.15, page 59. Find the Moment Generation Function and use that to find the mean and variance.

2. If X is a Binomially distributed random variable with $p = 0.6$ and $n = 3$, what is the mean and variance of X? Find the answer two ways: a) directly summing over the outcomes; and b) using the moment generation function.

3. Ramanathan, Practice Problem 3.9, page 48.

4. Assume that X is uniformly distributed on the interval $[-10, 10]$. Let $h(x)$ be the function x^2. Find $P\{h(X) \geq b\}$ (easiest to just use a graph) and $Eh(X)$ and verify that $Eh(X) \geq b\,P\{h(X) \geq b\}$ for $b = 2$ and $b = 6$. Also try to do the exercise for $h(x) = \exp(x)$.

5. Show that if X is uniformly distributed on the interval $[0, 1]$ then $Y = -\theta \log(X)$ follows an exponential distribution with mean θ. Explain why Jensen's inequality implies that $E(Y) > \log(2)$ for $\theta = 1$.