

Economics 520, Fall 2007

Homework 4

Due Tuesday, Sept 25 at beginning of class

1. CB 2.32.
2. Let X be a random variable with moment generating function $M_X(t)$, $-h < t < h$. Prove that

$$P(X \geq a) \leq \exp(-at) \cdot M_X(t), \quad 0 < t < h,$$

and

$$P(X \leq a) \leq \exp(-at) \cdot M_X(t), \quad -h < t < 0.$$

Hint: Use Markov's inequality.

3. R Exercise:
 - (a) Generate 1000 draws from a $N(0, 1)$ distribution, using the `rnorm` function. (Do not print out all 1000 draws, but keep them stored in a single vector variable for the next two parts of this question). Find the approximate probability that a $N(0, 1)$ random variable is greater than 1, based on your 1000 draws.
 - (b) Using the 1000 draws from the previous question, generate 1000 draws from a $N(1, 2)$ random variable. (Do not generate new random draws.) Find the approximate probability that a $N(1, 2)$ random variable is greater than 1.5.
 - (c) Using the same 1000 draws as before, generate 1000 draws for $Y = X^2$, where X has a standard normal distribution. What is the support of this distribution? What is the approximate mean of the distribution of Y , and the approximate variance of Y , and the approximate probability that Y is greater than 2?
4. R Exercise: use R to evaluate the probability indicated in the parenthetical remarks to CB question 3.5.