Econometrics I

Homework 1

Given: October 17, 2007

Due: October 24, 2007

Jin-Lung Lin

1 R programming

The file *TWNstock.dat* contains daily return of TAIEX, TSMC, UMC, FPG and ChinaSteel from 2004/01/03 to 2007/05/31. Read in the data (hint: use "read.table") and answer the following questions.

1. How many observations are there for each return?
2. Compute the mean, variance, skewness and kurtosis for each return.
3. Graph the time series plot for each return, one graph in each page.
4. Graph the histogram of each return and compare it with normal distribution with same mean and variance. (Hint: Use curve(dnorm(x),mean=...,add=T)

2 Terminology

Define and explain the following terms.

1. sample space
2. random variable
3. conditional probability
4. distribution function
5. independence
6. Law of large number
7. Central limit theorem

3 Binomial distribution

Let Y be the number of "heads" that occur when two coins are tossed.

1. Derive the probability distribution of Y.
2. Derive the cumulative probability distribution of Y.
3. Derive the mean and variance of Y

4 Bivariate distribution

X and Y are discrete random variables with the following joint distribution:

		values of Y				
		14	22	30	40	65
Value of X	1	0.02	0.05	0.10	0.03	0.01
	5	0.17	0.15	0.05	0.02	0.01
	8	0.02	0.03	0.15	0.10	0.09

That is $Pr(X = 1, Y = 14) = 0.02$, and so forth.

a Calculate the probability distribution, mean and variance of Y.

b Calculate the probability distribution, mean and variance of Y given $X = 8$.

c Calculate the covariances and correlation between X and Y.

5 Compute probability

Suppose $Y_i, i = 1, 2, \ldots, n$ are *i.i.d.* random variables, each distributed $N(10, 4)$.

a Compute $Pr(9.6 \leq \bar{Y} \leq 10.4)$ when (i) n=20, (ii) n=100, and (iii) n=1000.

b Suppose that c is positive number. Show that $Pr(10 - c \leq \bar{Y} \leq 10 + c)$ becomes close to 1.0 as n grows large.

c Use your answers in (b) to argue that $\bar{Y}$ converges in probability to 10.