MA 222. Assignment 12

due Wednesday April 23, 2008 at the beginning of the class.

For this assignment please install R and its editor tinn-R. Please follow the instruction at R-introduction. Please familiarize yourself with R basic commands. You will use this program in the following assignments.

Please solve the following problems:

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In addition use R for the following:

- Use R to generate samples of 30 observations from the uniform [0,1] distribution[1]. (The proper function in R is *runif()*. Please read its description.)

- For each such sample calculate the sample mean. What is the theoretical value for each such mean? (note that the sample mean is an approximate for the distribution mean)

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[1]This distribution has pdf:

$$f(x) = \begin{cases} 1 & \text{if } 0 < x < 1 \\ 0 & \text{else} \end{cases}.$$

You can calculate its mean and variance very easily as 1/2 and 1/12 respectively.

- Generate 100 such samples. Calculate the mean for each one of these samples. You should obtain a vector with 100 values. Produce a histogram of these values (use the function *hist()* with the option freq=TRUE)

- You have obtained an estimate for the distribution of the sample mean of the 30 observations. It is known that this distribution should be approximately normal with mean 0.5 and standard deviation 0.05270463. Why is this true? Superimpose a plot of this distribution over the histogram using the following code:

$$x=seq(0,1,by=0.001)$$
$$lines(x,dnorm(x,0.5,0.05270463),col="blue")$$

- Please hand in the resulting plot.

Bonus For an added 2 points repeat the above but with a sample mean of 100 generated observations. Note that the normal to be superimposed over the histogram has different parameters.