MATH 474 Homework 1
Due on Sept 2, 2015, Total=30 pts

Homework submission:

1. MATH 474-01 students must submit homework in class except for reasons approved by the Instructor.

2. MATH 474-02 students must email your homework to the TA Zinovia Drakou (zdrakou@hawk.iit.edu) before the end of the due date, i.e., 11:59 pm Sept 2, 2015. Don't email them to me. Don't submit them to Blackboard.

3. Do not include codes in your answer for Problem 3, if you use a R or Matlab. Just show the plot and answer the questions.

Problem 1 (6 points: 2, 2, 2)
Decide which ones of the following events are deterministic and which ones are random?

1. The Earth is orbiting the Sun and it takes roughly 365 days for earth to go around the Sun once.

2. It probably will rain tomorrow.

3. The Dow index will hit 10100 when the market concludes on 10/01/15.

Problem 2 (6 points: 2, 2, 2)
What are the populations and what are samples for the following activities or statistical studies?

1. 100 product units are randomly chosen from all the products that are produced from a certain assembling line in a factory, in order to evaluate the quality of this assembling line for maintenance purpose.

2. To study a particular type of gene of the Amazon pink river dolphin, scientists took the blood sample from 30 such dolphins from the Amazon River.

3. To see how cold it can be in January in Chicago, we can use the average lowest temperature in Chicago in January for the last ten years.

Problem 3 (8 points: 2, 1, 2, 3) Exercise 1.3 from Textbook

A certain polymer is used for evacuation systems for aircraft. It is important that the polymer be resistant to the aging process. Twenty specimens of the polymer were used in an experiment. Ten were assigned randomly to be exposed to the accelerated batch aging process that involved exposure to high temperatures for 10 days. Measurements of tensile strength of the specimens were made and the following data were recorded on tensile strength in psi.

No aging:	227	222	218	217	225
	218	216	229	228	221
Aging:	219	214	215	211	209
	218	203	204	201	205

(a) Do a dot plot of the data.

(b) From your plot, does it appear as if the aging process has had an effect on the tensile strength of this polymer? Explain.

(c) Calculate the sample mean tensile strength of the two samples.

(d) Calculate the median for both. Discuss the similarity or lack of similarity between the mean and median of each group.

Problem 4 (3 Points) Exercise 2.2 from Textbook

Use the rule method to describe the sample space S consisting of all points in the first quadrant inside a circle of radius 3 with center at the origin.

Problem 5 (7 Points: 2, 2, 3) Exercise 2.10 from Textbook

An engineering firm is hired to determine if certain waterways in Virginia are safe for fishing. Samples are taken from three rivers.

(a) List the elements of a sample space S, using the letters F for "safe to fish" and N for "not safe to fish."

(b) List the elements of S corresponding to event E that at least two of the rivers are safe for fishing.

(c) Define aii event that has as its elements the points

$$\{FFF, NFF, FFN, NFN\}.$$