**Jinyang li HW-01 MATH474-1**

**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.

deterministic

1. It probably will rain tomorrow.

random

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

random

**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.

Population : all the products that are produced from a certain assembling line in a factory

Sample: 100 product units are randomly chosen from above

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.

Population: the Amazon River pink dolphins.

Sample: 30 such dolphins from the Amazon River pink dolphins.

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.

Population: temperature in Chicago in January

Sample: 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

1. Do a dot plot of the data.
2. From your plot, does it appear as if the aging process has had an effect on the tensile strength of this polymer? Explain.

Yes, it has had. The blue line was under the yellow line, which means the aging will made the tensile strength lower due to the Y value is the tensile strength.

1. Calculate the sample mean tensile strength of the two samples.

Aging: 210.5

No aging: 222.1

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

*Median for both*:

Aging: 210

No aging: 221.5

In both cases the mean and the median value are extremely similar. Varying by 0.5 for aging and 0.4 for Non-aging.

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.

let the set S={(x,y) | x>=0 ,y>=0 , x^2 + y^2 <= 3^2}

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.”

S = {FFF, FFN, FNF, NFF, FNN, NFN, NNF, NNN}.

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

E = {FFF, FFN, FNF, NFF}.

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

{F F F, NF F, F F N, NF N}.

The second river is safe to fish