King Fahd University of Petroleum & Minerals

Mathematics & Statistics Department

STAT 319: Probability & Statistics for Engineers & Scientists

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Term 161

Second Major Exam

Tuesday 8/11/2016

5:30 – 7:00 PM

Please circle your instructor name:

Anabosi Al-Sawi Saleh Samuh

Std. Name: _____ Std. ID: _____ Serial No.: _____

Question No.	Full Mark	Marks Obtained
1.	10	
2.	16	
3.	16	
4.	18	
Total	**60**	

Q1]. . . [2+8 points] Suppose that only 60% of all drivers in Al-Khobar wear seat belt. A random sample of size 500 drivers is selected, and you assume that X is a random variable denote the number of drivers that wear seat belt.

1. What is the exact distribution of X?

2. Approximate the probability that X is between 270 and 320 inclusive. (State any assumptions if needed.)

Q2]. . . [3+3+6+4 points] At a computer manufacturing company, the actual size of computer chips is normally distributed with a mean of 1 centimeter and a standard deviation of 0.1 centimeter.

1. What is the 90^{th} percentile size?

2. A computer chip is randomly selected, find the probability that its actual size exceeds 0.9 centimeter.

3. A random sample of 12 computer chips is taken.
   (a) What is the probability that the sample mean will be between 0.99 and 1.01 centimeters?

   (b) Above what value do 2.5% of the sample means fall?

Q3]. . . [3+5+3+5 points] The following data show the starting salaries, in \$1000 per year, for a sample of senior engineers selected from a large company:

$$X_i : 152 \quad 169 \quad 178 \quad 179 \quad 185 \quad 188 \quad 195 \quad 196 \quad 198 \quad 203 \quad 204 \quad 209 \quad 210 \quad 212 \quad 214.$$

Note that $\sum_{i=1}^{15} X_i = 2892$ and $\sum_{i=1}^{15} X_i^2 = 561950$.

1. Construct a stem-and-leaf diagram of the salary. Comment on the shape.

2. Estimate the population mean, median, and standard deviation of the company's salary per year.

3. Calculate the interquartile range of the company's salary per year.

4. Construct a boxplot and comment on it in terms of skewness and outliers.

Q4]. . . [3+3+1+3+3+5 points] Customers arrive in a certain shop at a mean rate of 5 per hour. Assume that the number of arrivals per hour has a Poisson distribution.

1. Find the probability that exactly two customers will arrive in a given hour.

2. Find the probability that at least one customer will arrive within a 10-minute interval.

3. What is the expected waiting time (in minutes) before the first customer arrives?

4. What is the median time (in minutes) until the first arrival?

5. Find the probability that the shopkeeper will have to wait more than 5 minutes for the arrival of the first customer.

6. Find the probability that the total time between every two successive customers in a group of 36 will not exceed 4.8 hours.

GOOD LUCK