Prince Sultan University
STAT 101
Final Examination
Spring Semester 2008, Term 082
Monday, June 29, 2009
Dr. Quazi Abdus Samad

Time Allowed**: 120 minutes**

Name: _____ _____ _____
(First) (Middle) (Last)

ID Number: _____

Section No.: _____

Important Instructions*:*

You may use CASIO scientific calculator that does not have programming or graphing capabilities.
You may **NOT borrow** a calculator from anyone.
There should be **NO talking** during the examination.
Your exam will be taken **immediately** without any warning if your mobile is seen or heard
You must show all your work beside the problem. Be organized.
You may use the back of the pages for extra space, but be sure to indicate that on the page with the problem.
This examination has **11** problems with several parts in each case. Make sure that your paper has all these problems.

Problems	Max points	Student's Points
1	8	
2	10	
3,4	14	
5,6,7	19	
8,9,10	22	
11	07	
Total	**80**	

Question 1 (8 points) A law school administrator was interested in whether a student's score on the entrance exam can be used to predict a student's grade point average (GPA) after one year of law school. The administrator took a random sample of 15 students and computed the following summary information, where x = entrance exam score and y = GPA after one year:

$n = 15$, $\sum x_i = 1293$, $\sum y_i = 48.58$, $\sum x_i y_i = 4226.2$, $s_x = 6.9714$, and $s_y = 0.4236$.

a. Find the correlation coefficient between the entrance exam score and the grade point average after one year of law school.

b. Interpret the correlation coefficient found in the previous question in **a**.

c. Find the best fitting line relating grade point average after on year of law school and score on the entrance exam.

d. If a student scored 91 on the entrance exam, what would you predict the student's grade point average to be after one year of law school?

Question 2 (10 points) A group of forty people at a health club were classified according to their gender and smoking habits, as shown in the table below. One person is selected at random from that group of forty people.

Smoking Habits

Gender	Smoker (S)	Nonsmoker (N)	**Total**
Male (M)	2	24	26
Female (F)	6	8	14
Total	8	32	40

a. What is the probability the person smokes?

b. What is the probability the person is female and does not smoke?

c. What is the probability the person is male?

d. What is the probability the person is male and smokes?

e. If the person was male, what is the probability he smokes?

Question 3 (6 points) Michael takes either a taxi or a private car to go to work with probabilities 0.20 and 0.80, respectively. When he takes the taxi, he is late 35% of the days. When he takes the private car, he is late 25% of the days. If Michael is late for work on a particular day, what is the probability that he took the private car? **Show all steps**.

Question 4 (8 points) Let *x* be a random variable with the following probability distribution:

X	-6	-3	0	3	6
P(x)	0.2	0.2	0.1	0.3	0.2

a. Find the expected value of x. **Show the formula.**

b. Find the standard deviation of x. **Show the formula.**

c. What is the probability that x is outside one standard deviation from the mean?

d. Find P(-6<x<6)

Question 5 (8 points) It is known that 70% of the customers in a sporting goods store purchase a pair of running shoes. A random sample of 25 customers is selected. Assume that customers' purchases are made independently, and let *x* represent number of customers who purchase running shoes.

a. What is the probability that exactly 18 customers purchase running shoes?

b. What is the probability that no more than 19 customers purchase running shoes?

c. What is the probability that at least 17 customers purchase running shoes?

d. What is the probability that between 17 and 21 customers, inclusively, purchase running shoes?

Question 6 (6 points) Consider an experiment with 25 trials where the probability of success on any trial is 0.08, and let the random variable *x* be the number of successes among the 25 trials. Find the following probabilities based on the Poisson approximation to the binomial.

a. $P(x \leq 2)$

b. $P(x > 3)$

c. $P(3 \leq x \leq 4)$

Question 7 (5 points) A normal random variable x has an unknown mean μ and standard deviation $\sigma = 7.5$. If the probability that x exceeds 12.7 is 0.82, find μ.

Question 8 (7 points) A warehouse contains 10 computer printers, 4 of which are defective. A company randomly selects five of the 10 printers to purchase.

a. What is the probability all 5 are nondefective?

b. What is the mean of *x*?

c. What is the standard deviation of *x*?

Question 9 (6 points) a. Find a z_0 such that $P(z>z_0) = 0.035$

b. Find a z_0 such that $P(-z_0<z<z_0) = 0.7832$

c.Find a z_0 such that $P(z<z_0) = 0.90$

Question 10 (9 points) Suppose the random variable x has a binomial distribution corresponding to n = 20 and p = 0.4. Use Table 1 of Appendix I to calculate the following probabilities:

a. $P(x = 6)$

b. $P(x\geq 8)$

c. Use the normal approximation to calculate $P(x = 6)$

d. Use the normal approximation to calculate $P(x\geq 8)$

e.Compare with the exact probabilities obtained from Table 1 in Appendix I. **Do they match?**

Question 11 (7 points) The distribution of heights of adult males has a mean of 69 inches and a standard deviation of 4 inches. A random sample of 38 adult males is selected.

a. Find the mean and the standard deviation of the sample mean. Are they normally distributed? **Why or why not?**

b. Find the probability that the average height will be more than 70 inches.

c. Find the probability that the average height will be between 67.4 inches and 70.5 inches, inclusively.

Best of luck!