Prince Sultan University
STAT 101
Major II Examination
Fall Semester 2008, Term 081
Tuesday, December 23, 2008
Dr. Quazi Abdus Samad

Time Allowed**: 90 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 **09** problems with several parts in each case. Make sure that your paper has all these problems.

Problems	Max points	Student's Points
1,2	16	
3	6	
4,5,6	11	
7	6	
8,9	21	
Total	**60**	

Q.1. (6 points) Two dice are thrown.

a. List the sample space [3].

b. Find the probability that the sum of the faces of two dice is exactly 10 [1].

c. Find the probability that the sum of the faces of two dice is less than or equal to 9 [1].

d. Find the probability that the sum of the faces of two dice is greater than 7 [1].

Q.2. (10 points) Evaluate the following permutations and combinations (**please show the formulae in the first case**).

a. P_4^{11} [1]

b. P_{10}^{10} [1]

c. P_2^{21} [1]

d. C_4^{11} [1]

e. C_{10}^{10} [1]

f. C_2^{21} [1]

g. In how many ways can you select 5 people from a group of 25 if the order of selection is not important? [1]

h. In how many ways can you select 7 people from a group of 20 if the order of selection is important? [1]

i.Five dice are tossed. How many simple events are in the sample space? [1]

j.Five coins are tossed. How many simple events are in the sample space? [1]

Q.3. (6 points) An experiment consists of tossing a single die and observing the number of dots that show on the upper face. Events A, B and C are defined as follows:

A: Observe a number less than 5

B: Observe a number less than or equal to 3

C: Observe a number greater than 3

a. Find P(A/B) [2]

b. Find P(A UC) [2]

c. Find P(B∩C) [2]

Q.4. (2 points) Suppose that P(A) = .5 and P(B) = .3. If events A and B are independent, find these probabilities:

a. P(A ∩B) [1]

b. P(A UB) [1]

Q.5. (3 points) Suppose that P(A) = 0.4 and P(A∩B) = .12,

a. Find P(B/A) [1]

b. Are events A and B mutually exclusive? [1]

c. If P(B) = .3, are events A and B independent? [1]

Q.6. (6 points) An experiment can result in one or both of events A and B with the probabilities shown in the probability table below:

	A	A^C
B	.34	.46
B^C	.15	.05

Find the following probabilities (**please show the formula wherever applicable**):

a. P(A) [1]

b. P(B) [1]

c. $P(A \cap B)$ [1]

d. $P(A \cup B)$ [1]

e. P(A/B) [1]

f. P(B/A) [1]

Q.7. (6 points) A sample is selected from one of two populations, and, with probabilities $P(S_1) = 0.80$ and $P(S_2) = 0.20$. If the sample has been selected from S_1, the probability of observing an event *A* is $P(A/S_1) = 0.15$. Similarly, If the sample has been selected from S_2, the probability of observing *A* is $P(A/S_2) = 0.25$.

a. If a sample is randomly selected from one of two populations, what is the probability that event A occurs (**Please show the formula**)? [2]

b. If a sample is randomly selected and event *A* is observed, what is the probability that the sample was selected from population S_1 (**please show the formula**)? [2]

c. **.** If a sample is randomly selected and event *A* is observed, what is the probability that the sample was selected from population S_2 (**please show the formula**)? [2]

Q.8. (12 points) Let *x* be a random variable with the following distribution:

x	0	1	2	3	4	5
P(x)	0.1	0.3	0.4	0.1	0.05	0.05

a. Find the mean value of *x* **(please show the formula)**. [3]

b. Find the standard deviation of *x (***Please show the formula***)*. [3]

c. Find the probability that x falls into the interval μ±σ. [3]

d. Find the probability that x falls outside the range of μ±σ. [3]

Q.9. (9 points) Let x be a binomial random variable with n = 10 and p = 0.5. Find these values (**please show all steps**):

a. P (x =4) [1]

b. P(x≥4) [1]

c. P(x>4) [1]

d. $P(x<4)$ [1]

e. $P(x\leq 4)$ [1]

f. $P(3<x<7)$ [1]

g. the mean of the binomial variable [1]

h. the variance of the binomial variable [1]

i. the standard deviation of the binomial variable [1]

Best of luck!