King Fahd University Of Petroleum & Minerals
Department Of Mathematics And Statistics
STAT301 : Introduction to Probability Theory (162)
First Exam **Thursday March 23, 2017**

Name: **ID:**

Question Number	Full Mark	Marks Obtained
One	10	
Two	11	
Three	8	
Four	8	
Five	10	
Six	12	
Seven	10	
Eight	5	
Nine	6	
Ten	10	
Total	90	

Question.1 (**2+2+6=10-Points**)

Use counting principles to answer the following:

(a) How many different $8-$digits phone numbers are possible if the first three are among the digits $1-9$ and the other five among the digits $0-9$:

(b) How many different arrangements can be made from the word STATISTICS?

(c) A man and his wife entered a restaurant which offers three main types as a main dish classified as follows: 5 meat, 8 chicken, and 6 sea food dishes. How many possible choices they have if the decide to have

(i) Same type of main dishes

(ii) Different type of main dishes

Question .2 **(3+3+3+2=11-Points)**

From a group of 7 women and 5 men, a committee consisting of 3 mean and 3 women is to be formed. How many different committees are possible if:

(a) 2 of the men refuse to serve together

(b) 2 of the women refuse to serve together

(c) 1 of the men and 1 of the women refuse to serve together

(d) If there is no restriction on each group.

Question.3 **(8-Points)**

Show that $\binom{n}{1} + \binom{n}{3} + \binom{n}{5} + \ldots = \binom{n}{0} + \binom{n}{2} + \binom{n}{4} + \ldots$ (Hint: Use binomial Theorem)

Question.4 **(2+2+4=8-Points)**

A coin is tossed until the same result appears twice in succession for the first time. To every possible outcome requiring n tosses, attribute a probability of $\frac{1}{2^{n-1}}$

(a) Describe the sample space

(b) What is the probability that the experiments stops before the sixth toss?

(b) What is the probability that an even number of tosses required?

Question 5. **(3+3+2+2=10-Points)**

A certain town with population of $100,000$ has 3 newspapers: A, B and C. The proportions of people who read a paper or more as follows:
A: 10%, B: 30%, and C: 8%
A and B: 8%, A and C: 2%, B and C: 4% A, and B and C: 1%
A and B and C: 1%

A person from this town is selected at random

(a) Find the probability that the selected persons reads at least two newspapers?

(b) If A and C are morning papers, and B is an evening paper, what is the probability that the selected persons reads at least one morning plus an evening paper?

(c) What is the probability that the person reads only one morning and one evening paper?

(d) What is the probability that the person dose not read any newspaper?

Question 6. (**2+8+2=12-Points**)

A die is tossed three times. Let E_1: Exactly two sixes were obtained, E_2: All faces show an odd number, and E_3: The sum of the faces is 12

(a) Describe the sample space.

(b) Find the probability of each event defined above

(c) Find E_1E_2, and comment on your result

Question 7. (**10-Points**)

Suppose that six students took STAT-301 first exam, and after the instructor marked their exam, he mixed them randomly, and asked each student to select one marked exam randomly. What is the probability that none of the students selects his own exam?

Question 8. (**5-Points**)

If E, F, and G are independent. Show that E and $F^c \bigcup G$ are also independent.

Question 9. (**6-Points**)

Consider three urns. Urn A contains 2 white and 4 red balls, urn B contains 8 white and 4 red balls, and urn C contains 1 white and 3 red balls. If 1 ball is selected from each urn, what is the probability that the ball chosen from A was white given that exactly 2 white balls were selected?

Question 10. (**10-Points**)

Independent trails consisting of rolling a fair die are performed. What is the probability that the face lands to 6 before it lands to a number less than or equal to 3.