Prince Sultan University
STAT 101
Second Examination
Second Semester 2013/2014, Term 132
Thursday, 17th april 2014

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Time Allowed: 90 minutes

Maximum points: 40 points

Name: _____ _____ _____ ID Number # _____

(First) (Middle) (Last)

Important Instructions*:*

1. You may use CASIO scientific calculator that does not have programming or graphing capabilities.
2. You may NOT borrow a calculator from anyone.
3. You do NOT get special consideration if you forget your calculator.
4. Don't use notes or any notebook.
5. There should be NO talking during the examination.
6. Your exam will be taken immediately without any warning if your mobile is seen or heard.
7. You must show all your work beside the problem. Be organized.
8. You may use the back of the pages for extra space, but be sure to indicate that on the page with the problem.
9. This examination has ***9*** problems, some with several parts. Make sure that your paper has all these problems

Problem	Max points	Student's Points
1,2	9	
3,4	9	
5,6	9	
7,8,9	13	
Total	***40***	

Q1 (5 points) In a small town with two schools, 1000 students were asked if they had a cell phone. The results of the survey are shown below.

	Have a cell phone	Does not have a cell phone
School *A*	365	156
School *B*	408	71

One student is selected at random from this town,

(a) Find the probability that the selected student has a cell phone.

(b) Find the probability that the selected student is from school *A*.

(c) Find the probability that the selected student has a cell phone and from school *A*.

(d) Find the probability that the selected student has a cell phone given that he is from school *B*.

(e) Find the probability that the selected student does not have a cell phone or he is from school *A*.

Q2 (4 points) Given that $P(A)=0.4$, $P(A\cup B)=0.5$ and $P(B|A)=0.6$

(a) Find $P(A\cap B)$

(b) Find $P(B)$

(c) Find $P(A|B)$

(d) Are events A and B independent? Why?

Q3 (3 points) A student answers a multiple choice examination question that has four possible answers. Suppose that the probability that the student knows the correct answer to a question is 0.80 and the probability that the student guesses is 0.20. If the student guesses, the probability of guessing the correct answer is 0.25.
(a) Draw a tree diagram and determine the sample space.

(b) What is the probability that the fixed question will be answered correctly?

(c) If it is answered correctly, what is the probability that the student really knew the correct answer?

Q4 (6 points)
(a) A newspaper editor has received 8 books to review. He decides that he can use 3 reviews in his newspaper. How many different ways can these 3 reviews be selected?

(b) In a club there are 7 women and 5 men. A committee of 3 women and 2 men is to be chosen. How many different possibilities are there?

(c) How many different ways can a researcher select 5 rats from 20 rats and assign each to a different test?

(d) How many different 3-digit identification tags can be made if the digits can be repeated?

(e) When a card is drawn from a deck, what is the probability of getting a king?

(f) Three cards are drawn from an ordinary deck without replacement, what is the probability of getting all queens?

Q5 (5 points) Consider the following probability distribution.

X	0	1	2	3	4
$P(X)$	0.08	0.26	0.31	0.27	?

(a) Find $P(4)$

(b) Find $P(X > 2)$

(c) Find the mean.

(d) Find the variance.

(e) Find the standard deviation.

Q6 (4 points) A container van contains 30 motorcycles, 6 of which are defective. If 10 are sold at random, find the probability that :
(a) Exactly 6 are defective.

(b) At least 5 are defective.

(c) None is defective

(d) At most 1 is defective.

Q7 (3 points) A person pays $2 to play a certain game by rolling two dice. If he rolls doubles, he wins $6. Is the game fair? (The game is fair when $E(x)=0$)

Q8 (6 points) Assume that 4% of calculators are defective. In a lot of 120 calculators,

a) Find the probability that exactly 7 are defective.

b) Use the Poisson approximation to approximate the probability that 7 are defective.

c) Why it is possible to use the Poisson distribution to approximate the binomial in this question?

d) Find the probability that exactly 115 are not defective.

e) Find the expected number of defective calculators in a lot of 500.

f) Find the variance of defective calculators in a lot of 500.

Q9 (4 points) A box contains 4 white balls, 3 red balls, and 3 blue balls. A ball is selected at random, and its color is written down. It is replaced each time.
(a) Should we use the hypergeometric distribution or the multinomial distribution in this case? Why?

(b) Find the probability that if 5 balls are selected, 2 are white, 2 are red, and 1 is blue.