Prince Sultan University
Mathematics Department

STAT 101

Second Major Exam

Semester II, Term 142

Thursday, April 20, 2015

Time Allowed:**1: 30** minutes

Student Name: _____

Student ID #: _____ Section #:

Time:

Teacher's Name: Dr. Mohammed Dr. Benson

Important Instructions:

1. You may use a scientific calculator that does not have programming or graphing capabilities.
2. You may NOT borrow a calculator from anyone.
3. You may NOT use notes or any textbook.
4. There should be NO talking during the examination.
5. Your exam will be taken immediately if your mobile phone is seen or heard
6. Looking around or making an attempt to cheat will result in your exam being cancelled
7. This examination has 15 problems, some with several parts. Make sure your paper has all these problems.

Problems	Max points	Student's Points
1	10	
2,3	10,15	
4,	15	
5	15	
6	15	
Total	**80**	**/80 = %**

10 points

1. The probabilities are 0.4, 0.2, 0.3, and 0.1, respectively , that a delegate to a certain convention arrived by air, bus, automobile, or train. What is the probability that among 9 delegates randomly selected at this convention, 3 arrived by air, 3 arrived by bus, 1 arrived by automobile, and 2 arrived by train?

10 points

2 A large chain retailer purchases a certain kind of electronic device from a manufacturer. The manufacturer indicates that the defective rate of the device is 3%.

a. The inspector randomly picks 20 items from a shipment. What is the probability that there will be at least one defective item among these 20? **(3 points)**

b. The inspector randomly picks 20 items from a shipment. What is the probability that there will be exactly two defective items among these 20? **(3 points)**

c. The inspector randomly picks 10 items from a shipment. What is the probability that there will be between 2 to 5 defective. **(4 points)**

15 points

Q3 A computer crashes once every 2 days on average. Assume that the number of crashes follows a Poisson distribution.

a) What is the probability that the computer crashes 3 times in a week? **(3 points)**

b) What is the probability that the computer crashes between 5 and 7 times a week. **(4 points)**

c) What is the probability that the computer does not crash in a month **(4 points)**

d) What is the probability that there is at least 4 crashes in a month? **(4 points)**

15 points

4. The distribution of the number of imperfections per 10 meters of synthetic failure is given by

x	0	1	2	3	4
$\Pr(X = x)$	0.41	0.37	0.16	0.05	0.01

   a. Find the variance and standard deviation of the number of imperfections. **(5 points)**

   b. Find the probability of the number of imperfections within one standard deviation of the mean. **(5 points)**

   c. Find $\Pr\left(\left[x \le 1\right] \cup \left[x \le 4\right]\right)$ **(5 points)**

15 points

5. It is known that 7% of calculators produced at a certain factory are defectives. In a random sample of 20 calculators:

   a. What is the probability that exactly 5 will be defective **(3 points)**

   b. What is the probability that between 3 and 6 will be defective **(3 points)**

   c. What is the mean number of defectives **(3 points)**

   d. What is the standard deviation of the number of defectives **(3 points)**

   e. What is the probability that the number of defectives lies within one standard deviation of the mean? **(3 points)**

15 points

6. In an experiment to study the relationship of hypertension and smoking habits, the following data were collected for 180 individuals:

	Nonsmokers	**Moderate Smokers**	**Heavy Smokers**
H	21	36	30
NH	48	26	19

where H and NH in the table stand for *Hypertension* and *Nonhypertension,* respectively. If one of these individuals is selected at random, find the probability that the person is

a. Experiencing hypertension, given that the person is a heavy smoker. **(5 points)**

b. A nonsmoker, given that the person is experiencing no hypertension. **(5 points)**

c. Experiencing hypertension or the person is a moderate smoker. **(5 points)**