Prince Sultan University

Deanship of Educational Services
Department of Mathematics
and General Sciences

COURSE DETAILS:

Statistics and Probability Theory	STAT 101	Final Exam
Semester:	Spring Semester --Term 172	
Date:	May 15, 2018	
Time Allowed:	**180 minutes**	

STUDENT DETAILS:

Student Name:	
Student ID Number:	
Section/Time	
Instructor's Name:	Dr. Eric Benson Dr. Mohammed Kaouache

INSTRUCTIONS:

- You may use a scientific calculator that does not have programming or graphing capabilities. NO borrowing calculators.
- NO talking or looking around during the examination.
- NO mobile phones. If your mobile is seen or heard, your exam will be taken immediately.
- Show all your work and 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.

GRADING:

	Page 2	Page 3	Page 4	Page 5	Page 6	Page 7	Page 8	Page 9	Total
Questions	**10**	**10**	**6**	**12**	**12**	**8**	**10**	**12**	**80**
Marks									

1. Given two data sets

10 points

A

10.5	14.7	15.3	17.7	15.9	12.2	10.0
14.1	13.9	18.5	13.9	15.1	14.7	

B

9	28	15	21	12	22	29	
20	23	31	11	19	24	16	13

a. Find the CV for data set A. **(2 points)**

b. Find the CV for data set B. **(2 points)**

c. How can you compare the CV of data set A to the CV of data set B? **(3 points)**

d. Given a data point 15.3 from data set A and a data point 12 from data set B, how can you compare their standardize *z* values? **(3 points)**

10 points

2. A department store analyzed its most recent sales and determined the relationship between the way the customer paid for the item and the price category of the item. The joint probabilities in the following table were calculated.

	Cash	Credit Card	Debit Card
Less than $20	.09	.03	.04
$20–$100	.05	.21	.18
More than $100	.03	.23	.14

a. What proportion of purchases was paid by debit card? **(2 points)**

b. It is known that a customer paid more than $100, what is the probability that purchases was made by cash? **(3 points)**

c. Determine the proportion of purchases made by credit card or by debit card. **(2 points)**

d. It is known that a customer paid by debit card, what is the probability that purchases was made by cash? **(3 points)**

6 points

3. Three airlines serve a small town in Ohio. Airline A has 50% of all the scheduled flights, airline B has 30%, and airline C has the remaining 20%. Their on-time rates are 80%, 65%, and 40%, respectively.

   a. A plane has just left on time. What is the probability that it was airline A? **(2 points)**

   b. A plane has just left that is late. What is the probability that it was airline C? **(2 points)**

   c. A plane has just left on time. What is the probability that it was airline B? **(2 points)**

12 points

4. Using historical records, the personnel manager of a plant has determined the probability distribution of X, the number of employees absent per day. It is

x	0	1	2	3	4	5	6	7
$P(x)$	.005	.025	.310	.340	.220	.080	.019	.001

   a. Find the following probabilities. **(3 points)**

   $\Pr(2 \le X < 5)$

   $\Pr(X > 5)$

   $\Pr(X < 4)$

   b. Find the mean or expected value of X. **(3 points)**

   c. Find the standard deviation of X. **(3 points)**

   d. What percentage of the values of X lies within one standard deviation of the mean? **(3 points)**

12 points

5. A commercial for a manufacturer of household appliances claims that 3% of all its products require a service call in the first year. A consumer protection association wants to check the claim by surveying 400 households that recently purchased one of the company's appliances.

   a. What is the probability that the sample proportion $(\bar{p})$ requiring service call within the first year is greater than 5%? **(4 points)**

   b. What is the probability that the sample proportion requiring service call within the first year is between 2% and 4%?**(4 points)**

   c. What sample proportion $(\bar{p})$ is less than 78% of all the samples proportions? **(4 points)**

8 points

6. The amount of time the university professors devote to their jobs per week is normally distributed with a mean of 52 hours and a standard deviation of 6 hours.
    a. Find the probability that the mean amount of work per week for three randomly selected professors is more than 60 hours. **(2 points)**

    b. What mean amount of work per week for ten randomly selected professors is greater than 88% of all the sample means? **(3 points)**

    c. What amount of work per week for a randomly selected professor will lie in the lower 8% of all the times? **(3 points)**

10 points

7. In an effort to estimate the mean amount spent per customer for dinner at a major Atlanta restaurant, data were collected for a sample of 49 customers. Assume a population standard deviation of $5.

   a. At 95% confidence, what is the margin of error? **(2 points)**

   b. If the sample mean is $24.80, what is the 95% confidence interval for the population mean? **(4 points)**

   c. If the sample mean is $26.60, what is the 98% confidence interval for the population mean? **(4 points)**

12 points

8. Fifteen fast-food restaurants including Wendy's, McDonald's, and Burger King were visited during the summer of 2000 (The Cincinnati Enquirer, July 9, 2000). During each visit, the customer went to the drive-through and ordered a basic meal such as a "combo" meal or a sandwich, fries, and shake. The time between pulling up to the menu board and receiving the filled order was recorded. The times in minutes for the 30 visits are as follows:

0.9	1.0	1.2	2.2	1.9
6.8	1.3	3.0	4.5	2.8
2.6	3.3	5.0	4.0	7.2

a. Calculate the sample mean and standard deviation of the drive-through time at fast-food restaurants. **(2 points)**

b. At 95% confidence, what is the margin of error? **(2 points)**

c. What is the 95% confidence interval estimate of the population mean? **(4 points)**

d. What is the 90% confidence interval estimate of the population mean? **(4 points)**