KING FAHD UNIVERSITY OF PETROLEUM & MINERALS
DEPARTMENT OF MATHEMATICS AND STATISTICS

STAT 211 BUSINESS STATISTICS I
Semester 172, First Major Exam
Monday March 5, 2018

Serial Number

Please circle your instructor's name:

M. Malik M. Saleh

Name: _____ ID #:_____

Important Note:

- Formula sheet will be provided to you in exam. You are not allowed to bring, with you, formula sheet or any other printed/written paper.
- Mobiles are not allowed in exam. If you have your mobile with you, turn it off and put it under your seat so that it is visible to proctor.
- Show all your work including formulas, intermediate steps and final answer. No points for answer without justification.
- Round up to 4 decimal points if needed.
- Make sure you have 7 unique pages of exam paper (including this title page).

Question No	Full Marks	Marks Obtained
1	7	
2	14	
3	10	
4	10	
5	5	
6	4	
Total	50	

Q1:

A. As part of marketing survey, you ask customers to list the number of children they have by placing a check by the appropriate category:___0, ___1,___2,___3,___>3

a. Specify the level of measurement that such response exhibit. (1 *pt.*)

b. Would it be possible to calculate the average number of children for the respondents to this survey? Indicate how you would modify the survey so you could calculate such a statistic. (2 *pts.*)

B. The Ford Motor Company has been advertising a series of comparisons between its cars and competitors cars. What level of data measurement would each of the following be?

a. The sound level measured in decibels inside the car. (1 *pt.*)

b. Drivers' ratings of the handling characteristics of the car. (1 *pt.*)

c. The mileage ratings in mile per gallon for the cars. (1 *pt.*)

d. The indication of whether a stereo radio is standard equipment on a car. (1 *pt.*)

Q2: A building contractor whose company builds many homes every year. In planning for each job, the contractor needs some ideas about the direct labor hours required to build a home. He has collected sample information on the labor hours for 12 jobs during past week.

22	3	24	12	26	14	27	32	82	50	31	61

a. Make a stem – and – leaf plot for the data. (3 *pts.*)

b. Depend on the stem – and leaf plot, examine the distribution (briefly): (3 *pts.*)

- Shape:
- Modes:
- Possible outliers:

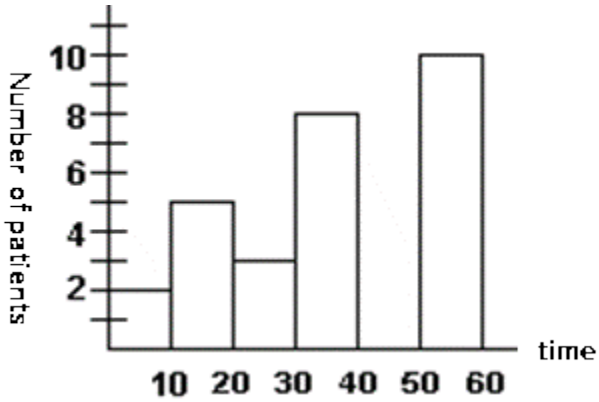
c. Compute the mean, the median, and the standard deviation. Comment on the shape. (4 *pts.*)

d. If the contractor had to select the mean or the median as the measure of location for direct labor hours, what factors about each should he consider before making the decision? Which measure would you suggest he use? (2 *pts.*)

e. Find the 55^{th} percentile, and interpret it. (2 *pts.*)

Q3:

A. Below the histogram of waiting times (in minutes) for patients at a health clinic. Approximate the mean and interpret it. (4 *pts.*)



B. The Bureau of the Census reports that the median family income for all families in the United States during the year 2003 was $43318. That is, half of all American families had incomes exceeding this amount, and half had incomes equal to or below this amount. Suppose that three families are surveyed and that each one reveals whether their income exceeded $43318 in 2003.

   a. List the points in the sample space. (4 *pts.*)

   b. Identify the event "Exactly two families had incomes exceeding $43318". (1 *pt.*)

   c. Make use of the given information for the median to assign probability to the event in part b above. (1 *pt.*)

Q4: The probability that stock A will rise in price is 0.3 and that stock B will rise in price is 0.4. Further, if stock B rises in price, the probability that stock A will also rise in price is 0.7

a. What is the probability that both stocks will rise in price? (2 *pts.*)

b. What is the probability that at least one of the stocks will rise in price? (2 *pts.*)

c. What is the probability that only stock A will rise in price? (2 *pts.*)

d. Are the events A and B mutually exclusive? Explain. (2 *pts.*)

e. A and B independent? Explain. (*2 pts.*)

Q5: An insurance company believes that people can be divided into two classes: those who are accident prone and those who are not. Their statistics show that an accident-prone person will have an accident at some time within a fixed 1-year period with probability 0.40, whereas this probability decreases to 0.20 for a non-accident-prone person. Assume that 30% of the population is accident prone.

a. What is the probability that that a new policyholder will have an accident within a year of purchasing a policy? (3 *pts.*)

b. Suppose that a new policyholder has an accident within a year of purchasing a policy. What is the probability that he or she is an accident prone? (2 *pts.*)

Q6: Let A, B, C be three events defined on a sample space such that:

i. Events A and B are mutually exclusive, while events A and C are independent.
ii. The probability that event B occurs given that event C occurs is 0.3
iii. The probability that events A occurs given that event C occurs is 0.25.
iv. Events A and B are equally likely and event C is three times as likely to occur as event A.

What is the probability that none of the three events A, B, C occur? (4 *pts.*)

Formula Sheet

Descriptive Statistics

- Sample Mean $\bar{x} = \frac{\sum x_i}{n}$ or $\bar{x} = \frac{\sum x_i f_i}{n}$
- Sample Variance $s^2 = \frac{\sum x_i^2 - n\bar{x}^2}{n-1}$ or $s^2 = \frac{\sum x_i^2 f_i - n\bar{x}^2}{n-1}$
- Percentiles: $R_\alpha = \frac{(n+1)\alpha}{100}$ & $P_\alpha = X_{(i)} + d\left(X_{(i+1)} - X_{(i)}\right)$

Probability

- $P(A \cup B) = P(A) + P(B) - P(A \cap B)$
- $P(A|B) = \frac{P(A \cap B)}{P(B)}, P(B) > 0$
- $P\left(A_j \middle| B\right) = \frac{P(A_j \cap B)}{P(B)} = \frac{P(A_j)P\left(B \middle| A_j\right)}{\sum_{i=1}^{k} P(A_i)P(B|A_i)}, \quad j = 1, 2, \dots, k$