KING FAHD UNIVERSITY OF PETROLEUM & MINERALS
DEPARTMENT OF MATHEMATICS AND STATISTICS
Term 181

STAT 211 BUSINESS STATISTICS I
First Exam
15 October 2018 at 5:45 PM

Name:_____ **ID #:**_____ **Srl #:**___

SECTION: 1 2 3
Important Notes:

1) You must **show all work** to obtain full credit for questions on this exam.
2) Define all the events in every question of probability.

Question No	Full Marks	Marks Obtained
Q1	3	
Q2	4	
Q3	6	
Q4	5	
Q5	8	
Q6	6	
Q7	15	
Q8	5	
Q9	8	
Q10	10	
Total	*70*	

1. (3 pts) A businessman who is running for the vacant City Commission seat with 20,000 registered voters conducts a survey. In the survey, 55% of the 300 registered voters interviewed say they planned to vote for him.

   I. What is the population of interest?

   II. What is the sample?

   III. Is the 55% a parameter or a statistic?

2. (4 pts)Identify each of the following studies as either **D**escriptive statistics or statistical **I**nference:

#	Study	**D** / **I**
1	Examine the weights of a sample of 25 manufacturer parts to see if the average weight of all the parts produced by the process is 3 pounds.	
2	Post the average final score for the statistics class.	
3	Estimate the percentage of the City population that will vote for Ahmad in the next municipality(city hall) election.	
4	Select a random sample of 50 babies born in 2017 and estimate the birth weight of all babies born during the same year.	

3. (6 pts) Indicate whether each statement is True or False:

#	Statement	Answer (T / F)
1	Interval data may be treated as ordinal or nominal.	
2	Nominal data may be treated as ordinal or interval	
3	If we draw a straight line through the points in a scatter diagram and most of the points fall close to the line, we say that there is a **positive** linear relationship between the two variables.	
4	Professor Hogg graduated from the University of Iowa with a code value = 2 while professor Maas graduated from Michigan State University with a code value = 1. The scale of measurement likely represented by this information is ratio.	
5	Football rankings for teams is an example of an interval scale.	
6	When a distribution has more values to the left and tails to the right, it is skewed negatively.	

4. (3+2=5 pts)The sales for twelve grocery stores (in thousands of dollars) for the last month were as follows:

Store	1	2	3	4	5	6	7	8	9	10	11	12
Sales	50	30	55	40	20	93	100	105	103	50	20	94
%	7%	4%	7%	5%	3%	12%	13%	14%	14%	7%	3%	12%

I. Construct a Pareto chart. Comment on sales for the stores.

II. Which chart is more appropriate for this data: Bar chart OR Pareto chart? Explain.

5. (2+3+3 pts)The frequency distribution of the number of years of service for 100 employees is shown below:

Years	Frequency
0 up to 5	12
5 up to 10	16
10 up to 15	42
15 up to 20	20
20 up to 25	10
Total	**100**

I. Construct a cumulative relative frequency distribution for the data.

II. Construct a percentage histogram for data. Comment on the shape.

Comment:

III. Estimate the proportion of employees who have:

A. less than 10 years of service.

B. more than 20 years of service.

C. between 10 and 20 years of service.

6. (3+3 pts)The operations manager of a plant that manufactures tires wants to compare the actual inner diameters of two grades of tires, each of which is expected to be 575 millimeters. A sample of five tires of each grade was selected, and the results representing the inner diameters of the tires, ranked from smallest to largest, are as follows:

Grade X	568	570	675	578	584
Grade Y	573	574	575	577	578

Given:

$$\sum x = 2975\ ,\ \sum y = 2877\ ,\ \sum x^2 = 1778289\ ,\ \sum y^2 = 1655443$$

I. For each of the two grades of tires, compute the mean, median, and standard deviation.

II. Which grade of tire is providing better quality? Explain.

7. (7+3+2+3 pts)The following sample data shows the overall miles per gallon (MPG) of 2010 small SUVs:

16	16	18	18	18	19	19	19	19
21	21	21	21	21	21	21	22	22
22	22	22	23	24	26	39	40	

Given: $\bar{x} = 21.96153846$, $S = 5.646101446$

A. (1+1+1+2+2 pts) Compute the

1. Median
2. Mode
3. Range
4. First quartile

5. Third quartile

B. Using *Z*-scores, Are there any outliers *Z* scores.
Are there any outliers

C. Are the data skewed? If so, how?

D. Draw the box-plot for the data.

8. (5 pts) Among a large group of patients recovering from shoulder injuries, it is found that 22% visit both a physical therapist and a chiropractor, whereas 12% visit neither of these. The probability that a patient visits a chiropractor exceeds by 14% the probability that a patient visits a physical therapist. Determine the probability that a randomly chosen member of this group visits a physical therapist.

9. (2+2+2+2 pts)A statistics professor classifies his students according to their grade point average (GPA) and their gender. The accompanying table gives the proportion of students falling into the various categories. One student is selected at random.

	GPA		
Gender	**Under 2.0**	**2.0 – 3.0**	**Over 3.0**
Male	0.05	0.25	0.10
Female	0.10	0.30	0.20

I. If the student selected is female, what is the probability that her GPA is between 2.0 and 3.0?

II. If the GPA of the student selected is over 3.0, what is the probability that the student is male?

III. What is the probability that the student selected is female or has a GPA under 2.0 or both?

IV. Is GPA independent of gender? Explain using probabilities.

10. (6+4 pts) Olive Construction Company is determining whether it should submit a bid for a new shopping center. In the past, Olive's main competitor, Base Construction Company, has submitted bids 70% of the time. If Base Construction Company does not bid on a job, the probability that Olive Construction Company will get the job is 0.50. If Base Construction Company bids on a job, the probability that Olive Construction Company will get the job is 0.25.

I. What is the probability that Olive Construction Company will get the job?

II. If Olive Construction Company gets the job, what is the probability that Base Construction Company did not bid?