KING FAHD UNIVERSITY OF PETROLEUM & MINERALS
DEPARTMENT OF MATHEMATICS

STAT 211 BUSINESS STATISTICS I
Semester 231, Major Exam 1
Thursday September 28, 2023

Time allowed 100 minutes.

Name: _____ ID #: _____

Section #: _____ Serial #: _____

Important Notes:

- You are not allowed to bring formula sheet or any other printed/written paper.

- Make sure you have 11 pages of exam paper (including this title page) and 20 questions.

- Students are not allowed to enter the exam hall without either KFUPM ID or Saudi ID/ Iqama ID.

- Students must take the exam in the place assigned to them.

- Students are not allowed to carry mobiles, smart watches, or electronic devices to the exam halls/rooms.

- Violations of these rules will result in a penalty decided by the chairman of Math Department.

FORMULAS

- $\bar{x} = \frac{\sum x}{n}, \quad S = \sqrt{\frac{\sum\left(x - \bar{x}\right)^2}{n-1}} = \sqrt{\frac{\sum x^2 - n(\bar{x})^2}{n-1}},$

- $C.V = \frac{S}{\bar{x}} 100\%, \quad C.S = \frac{3(\bar{x} - median)}{s}$

- $P_\alpha = X_{(i)} + d\left(X_{(i+!)} - X_{(i)}\right) \quad where \quad R_\alpha = \frac{\alpha(n+1)}{100}$

1. Coffee is sold in three sizes at a fast-food restaurant: small, medium, and large. The beverage size of coffee is an example of

   A. An ordinal scaled variable.
   B. A ratio scaled variable
   C. A nominal scaled variable
   D. An Interval scaled variable
   E. A quantitative variable

2. Suppose the following information is collected from Robert Keeler on his application for a home mortgage loan at the Metro County Savings and Loan Association.

   1. Monthly payments
   2. Number of jobs in past 10 years
   3. Annual family income
   4. Marital status
   5. Level of Job satisfaction
   6. Number of children in the family

   Which of the following responses is correct about the type of data and measurement scale:

   A. 1 and 3 are numerical, continuous, ratio scale
   B. 5 and 6 are numerical, discrete, ratio scale
   C. 2 and 3 are categorical, nominal scale
   D. 1 and 4 are categorical, ordinal scale
   E. 3 and 5 are numerical, continuous, interval scale

3. Suppose that you measure the time it takes to download a video from the Internet. The download time is

   A. A continuous numerical variable
   B. A discrete numerical variable
   C. An interval scaled variable
   D. A categorical variable
   E. An ordinal scaled variable

4. A sample of 44 graduate students answered the following survey:

   1. What is your gender?
   2. What is your age?
   3. What is your current major area of study?
   4. What is your current graduate cumulative GPA?
   5. What was your undergraduate major?
   6. What was your undergraduate cumulative GPA?
   7. What is your current employment status?
   8. How many different full-time jobs have you held in the past 10 years?
   9. What do you expect your annual salary if you are employed full time?
   10. How much money did you spend this semester for textbooks and supplies?

   Which variables in the survey are numerical?

   A. 2, 4, 6, 8, 9, 10
   B. 2, 4, 6, 7, 8, 9
   C. 2, 3, 4, 6, 8, 10
   D. 2, 4, 5, 6, 8, 9, 10
   E. 2, 3, 4, 7, 8, 9, 10

5. The Energy Information Administration reported the following sources of electricity in the United States in 2008:

Source of Electricity	Net Electricity Generation (millions of megawatt-hours)
Coal	1,994.4
Hydroelectric	248.1
Natural gas	876.9
Nuclear	806.2
Other	184.7

Source: Energy Information Administration, 2008.

What is the percentage of Nuclear Source in Electricity Generation.

A. 19.61%
B. 21.33%
C. 4.49%
D. 48.52%
E. 6.04%

6. The GMAT scores from a sample of 50 applicants to an MBA program indicate that none of the applicants scored below 450. A frequency distribution was formed by choosing class intervals 450 but less than 500, 500 but less than 550, and so on, with the last class having an interval from 700 but less than 750. Two applicants scored in the interval 450 to 500. Sixteen applicants scored in the interval 500 to 550. Nine applicants scored in the interval 600 to 650. Twelve applicants scored in the interval 650 to 700. Three applicants scored in the interval 700 to 750.

What is the relative frequency of applicants scored between 550 and 600?

A. 0.16
B. 0.08
C. 0.18
D. 0.24
E. 0.12

7. The following table is the frequency distribution about the cost of electricity during July 2010 for a random sample of 50 one-bedroom apartments in a large city. Find the cumulative percentage for the group of electricity cost $160 up to $180.

Electricity Costs	Frequency
$80 but less than $100	4
$100 but less than $120	7
$120 but less than $140	9
$140 but less than $160	13
$160 but less than $180	9
$180 but less than $200	5
$200 but less than $220	3

A. 84%
B. 66%
C. 18%
D. 26%
E. 94%

8. For each of the following variables, determine which one is **not** true.

A. Number of online purchases made in a month is a numerical, discrete, interval scale
B. Name of Internet service provider is a categorical, nominal scale
C. Time in hours spent surfing the Internet per week is a numerical, continuous, ratio scale
D. Number of emails received in a week is a numerical, discrete, ratio scale
E. Salary of a fresh undergraduate Electrical Engineer is a numerical, continuous, ratio scale

9. A population of 2-liter bottles of cola is known to have a mean fill-weight of 2.06 liters and a standard deviation of 0.02 liters. The population is known to be bell-shaped. Approximately 95% of the bottles will contain between

   A. 2.02 and 2.10 liters
   B. 2.04 and 2.08 liters
   C. 2.00 and 2.12 liters
   D. 2.02 and 2.12 liters
   E. 2.04 and 2.10 liters

10. A survey asked 1,264 women who were their most trusted shopping advisers. The survey results were as follows:

Shopping Advisers	Percentage (%)
Advertising	7
Friends/family	45
Manufacturer websites	5
News media	11
Online user reviews	13
Retail websites	4
Salespeople	1
Other	14

Source: Data extracted from "Snapshots," *USA Today,* October 19, 2006, p. 1B.

Which graphical method do you think is best for portraying these data?

   A. Pareto chart
   B. Stem and Leaf plot
   C. Histogram
   D. Box plot
   E. Probability plot

11. To study a situation in which the Pareto chart proved to be especially appropriate, consider the problem faced by a bank. The bank defined the problem to be the incomplete automated teller machine (ATM) transactions. Data concerning the causes of incomplete ATM transactions were collected and stored in. The following Table shows the causes of incomplete ATM transactions, the frequency for each cause, and the percentage of incomplete ATM transactions due to each cause.

Cause	Frequency	Percentage (%)
ATM malfunctions	32	4.42
ATM out of cash	28	3.87
Invalid amount requested	23	3.18
Lack of funds in account	19	2.62
Magnetic strip unreadable	234	32.32
Warped card jammed	365	50.41
Wrong key stroke	23	3.18
Total	724	100.00

Source: Data extracted from A. Bhalla, "Don't Misuse the Pareto Principle,"
*Six Sigma Forum Magazine*, May 2009, pp. 15–18.

The vital few categories are

A. Magnetic strip unreadable and Warped card jammed
B. ATM malfunctions, Atm out of cash, Invalid amount requested, lack of funds in account, Wrong key stroke
C. Invalid amount requested, lack of funds in account, Wrong key stroke
D. Magnetic strip unreadable and Lack of funds in account
E. Warped card jammed, ATM malfunctions, and ATM out of cash

12. The co-efficient of variation for the amount that a sample of nine customers (given below) spent for lunch ($) at a fast-food restaurant, respectively, are:

   4.20   5.03   5.86   6.45   7.38   7.54   8.46   8.47   9.87

A. 25.79%
B. 7.38%
C. 3.2851%
D. 1.8125%
E. 46.73%

13. The following histogram visualizes the data about the property taxes per capita for the 50 states and the District of Columbia.

Histogram of Property Taxes Per Capita
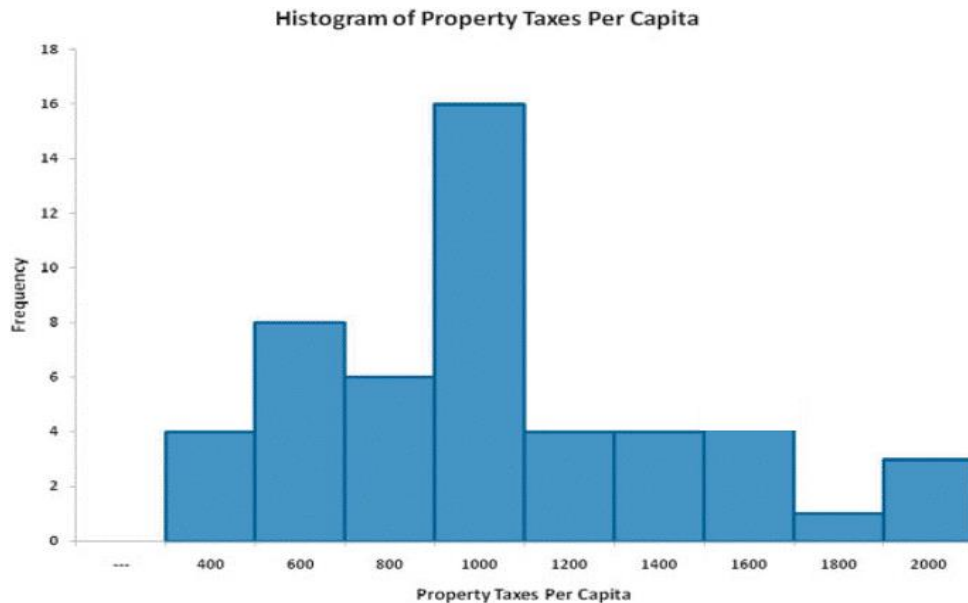
Find the relative frequency for the property Tax per capita $900 to $1300

A. 0.40
B. 0.32
C. 0.08
D. 0.44
E. 0.52

14. Consider a population of 1,024 mutual funds that primarily invest in large companies. You have determined that the mean one-year total percentage return achieved by all the funds, is 8.20 and that the standard deviation, is 2.75. Assuming the distribution of the mutual funds is bell-shaped and according to the empirical rule, the percentage of these funds that are expected to be within 1, 2, and 3 standard deviations of the mean, respectively, are?

A. 68%, 95%, 99.7%
B. 65%, 95%, 99.7%
C. 68%, 93%, 99.7%
D. 75%, 90.5%, 99%
E. 90%, 95.5%, 99%

Following data gives the cost per ounce ($) for a sample of 14 dark chocolate bars:

1.51	1.41	0.94	0.9	0.77	0.68	0.57
1.42	1.14	0.92	0.86	0.72	0.57	0.55

Using the data above answer the following two questions:

15. The mean, median and range for the above data, respectively, are:

 A. 0.9257, 0.88, and 0.96
 B. 0.9257, 0.88, and 0.36
 C. 0.9257, 0.11, and 0.96
 D. 0.9257, 0.33, and 0.96
 E. 0.88, 0.9257, and 0.36

16. The number of outliers in the data are:

 A. 0
 B. 1
 C. 2
 D. 3
 E. 4

17. The following is a stem-and-leaf display representing the amount of gasoline purchased, in gallons (with leaves in tenths of gallons, i.e. the maximum is 13.2), for a sample of 25 cars that use a particular service station on the New Jersey Turnpike:

9	147
10	02238
11	125566777
12	223489
13	02

What amount of gasoline (in gallons) is most likely to be purchased?

A. 11.7
B. 117
C. 116
D. 11.6
E. 9.7

18. The following table contains the cost ($) per ounce for a sample of 14 dark chocolate bars:

0.55	0.57	0.72	0.86	0.92	1.14	1.42
0.57	0.68	0.77	0.90	0.94	1.41	1.51

The first quartile, third quartile and the interquartile range, respectively, are:

A. Q1 = $0.68, Q3 = $1.14 and IQR = $0.46
B. Q1 = $0.68, Q3 = $1.25 and IQR = $0.46
C. Q1 = $0.95, Q3 = $1.14 and IQR = $0.46
D. Q1 = $0.95, Q3 = $1.14 and IQR = $0.22
E. Q1 = $0.37, Q3 = $1.14 and IQR = $0.46

19. A set of data has values that vary from 11.6 to 97.8. If these values are grouped into nine classes. What class interval width did you choose?

   A. 10
   B. 5
   C. 20
   D. 15
   E. 2

20. The file contains the life (in hours) of a sample of 40 100-watt light bulbs produced by Manufacturer A and a sample of 40 100-watt light bulbs produced by Manufacturer B. The following table shows these data as a pair of ordered arrays:

Manufacturer A					Manufacturer B				
684	697	720	773	821	819	836	888	897	903
831	835	848	852	852	907	912	918	942	943
859	860	868	870	876	952	959	962	986	992
893	899	905	909	911	994	1,004	1,005	1,007	1,015
922	924	926	926	938	1,016	1,018	1,020	1,022	1,034
939	943	946	954	971	1,038	1,072	1,077	1,077	1,082
972	977	984	1,005	1,014	1,096	1,100	1,113	1,113	1,116
1,016	1,041	1,052	1,080	1,093	1,153	1,154	1,174	1,188	1,230

Construct a percentage distribution for each manufacturer, using the following class interval widths for each distribution:
Manufacturer A: 650 but less than 750, 750 but less than 850, and so on.
Manufacturer B: 750 but less than 850, 850 but less than 950, and so on.
The sum of the percentages of the fourth-class interval of Manufacturer A and the fourth-class interval of Manufacturer B is

   A. 45
   B. 62.5
   C. 30
   D. 12.5
   E. 70