King Fahd University of Petroleum and Minerals
Department of Mathematics

CODE00   CODE00

STAT 211
Major Exam I
Term 221
04-October-2022

Name: _____

ID: _____ Sec: _____.

Check that this exam has 20 questions.

Important Instructions:

1. All types of calculators may be used, provided that they cannot store text.

2. Use HB 2.5 pencils only.

3. Use a good eraser. DO NOT use the erasers attached to the pencil.

4. Write your name, ID number and Section number on the examination paper and in the upper left corner of the answer sheet.

5. When bubbling your ID number and Section number, be sure that the bubbles match with the numbers that you write.

6. The Test Code Number is already bubbled in your answer sheet. Make sure that it is the same as that printed on your question paper.

7. When bubbling, make sure that the bubbled space is fully covered.

8. When erasing a bubble, make sure that you do not leave any trace of penciling.

1 Your current employment status (Full time, Part time, Unemployed) is an example of

   (a) A categorical variable of a nominal level.
   (b) A categorical variable of an ordinal level.
   (c) A numerical variable of a nominal level.
   (d) A numerical variable of a discrete level.
   (e) A categorical variable of a continuous level.

2 Your expected starting annual salary (in SR000) to be if you were to seek full-time employment immediately after obtaining your bachelor's degree is an example of

   (a) A numerical variable of a continuous level.
   (b) A categorical variable of an ordinal level.
   (c) A categorical variable of a nominal level.
   (d) A numerical variable of a nominal level.
   (e) A numerical variable of a discrete level.

3 The manager of the customer service division of a major consumer electronics company is interested in determining whether the customers who have purchased a videocassette recorder made by the company over the past 12 months are satisfied with their products. The possible responses to the question "Out of a 100 point score with 100 being the highest and 0 being the lowest, what is your satisfaction level on the videocassette recorder that you purchased?" are values from a

  (a) A categorical random variable.
  (b) A discrete numerical random variable.
  (c) A continuous numerical random variable.
  (d) A numerical random variable.
  (e) A parameter

4 Professor Matherly graduated from the University of Tennessee with a code value = 1 while Professor Hansen graduated from the University of Wisconsin with a code value = 2. The scale of measurement likely represented by this information is:

  (a) nominal
  (b) ordinal
  (c) interval
  (d) ratio
  (e) numerical

5 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.

The most appropriate graph(s) for this data is

(a) pareto diagram
(b) histogram
(c) stem and leaf plot
(d) bar plot and box plot
(e) pie chart and histogram

6 The following data is about the cost of electricity during July 2010 for a random sample of 50 one-bedroom apartments in a large city

96	171	202	178	147	102	153	197	127	82
157	185	90	116	172	111	148	213	130	165
141	149	206	175	123	128	144	168	109	167
95	163	150	154	130	143	187	166	139	149
108	119	183	151	114	135	191	137	129	158

In order to construct a frequency distribution for this data the appropriate width of the intervals is

(a) 20
(b) 2
(c) 5
(d) 50
(e) 100

7 Using the following Relative Frequency Distributions and Percentage Distributions of the Cost of Meals at 400 City Restaurants.

| | CITY | |
COST PER MEAL ($)	Relative Frequency	Percentage (%)
20 but less than 30	0.12	12.0
30 but less than 40	0.14	14.0
40 but less than 50	0.38	38.0
50 but less than 60	0.18	18.0
60 but less than 70	0.12	12.0
70 but less than 80	0.06	6.0
Total	1.00	100.0

The frequency for the cost group 50 but less than 60 is

(a) 72
(b) 152
(c) 48
(d) 56
(e) 24

8 Nutritional data about a sample of seven breakfast cereals (stored in) includes the number of calories per serving:

Cereal	Calories
Kellogg's All Bran	80
Kellogg Corn Flakes	100
Wheaties	100
Nature's Path Organic Multigrain Flakes	110
Kellogg Rice Krispies	130
Post Shredded Wheat Vanilla Almond	190
Kellogg Mini Wheats	200

The sum of squared deviations is 13,200. Find the standard deviation of the calories in the cereals.

(a) 46.90
(b) 2,200
(c) 130.45
(d) 362.63
(e) 131,500

9 The following data contains the cost per ounce ($) for a sample of 14 dark chocolate bars:

```
0.68  0.72  0.92  1.14  1.42  0.94  0.77

0.57  1.51  0.57  0.55  0.86  1.41  0.90
```

Find the coefficient of variation.

(a) 35.36%
(b) 32.73%
(c) 10.71%
(d) 31.59%
(e) 37.68%

10 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. What proportion of the observations is between 2.02 and 2.10?

(a) 95%
(b) 75%
(c) 99.7%
(d) 50%
(e) 68%

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

   (a) 0.325

   (b) 0.175

   (c) 0.150

   (d) 0.462

   (e) 0.857

12 In a study of a manufacturing process, 10% of all parts tested were found to be defective and 30% of all parts were produced on machine A. Given that a part was produced on machine A, there is a 0.15 probability that it is defective. Calculate the probability of a part being defective or produced on machine A.

   (a) 0.355

   (b) 0.15

   (c) 0.045

   (d) 0.3

   (e) 0.1

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

(a) 0.462

(b) 0.175

(c) 0.150

(d) 0.325

(e) 0.857

14 The histogram below shows the frequency distribution of the total cost (in \$) of a basket of assorted items in a random sample of hypermarkets.

Histogram of Cost(\$)
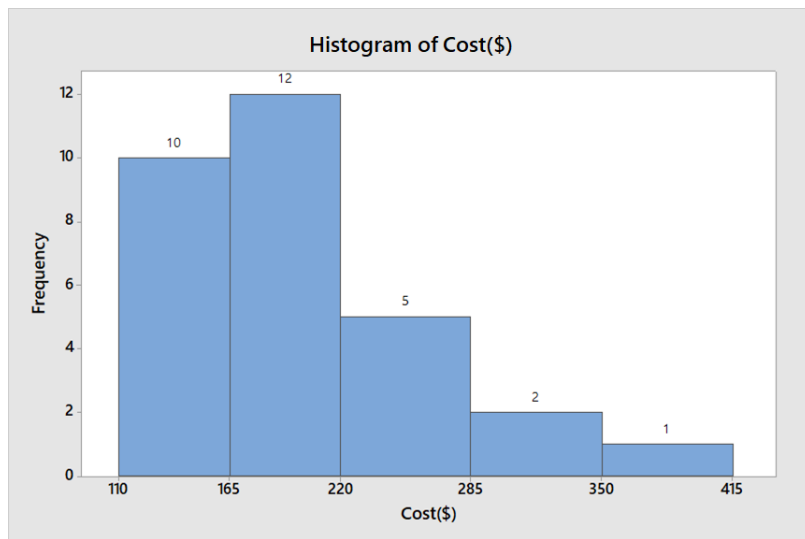
If the first class in the above histogram is (\$110 , \$165], then the percentage of hypermarkets with a cost of (\$165 , \$220] is

(a) 40.00

(b) 33.33

(c) 16.67

(d) 73.33

(e) 56.67

15 The stem-and-leaf plot below shows the protein content of popular protein foods (fresh red meats, poultry, and fish).

```
Stem Leaf
1    24
1    6779
2    123334
2    5677777888899
3    00023
```

The mean and median of the protein content are, respectively

(a) 24.733 and 27
(b) 25.846 and 27
(c) 24.73 and 24
(d) 25.846 and 26
(e) 24.733 and 27.5

16 The stem-and-leaf plot below shows the protein content of popular protein foods (fresh red meats, poultry, and fish).

```
Stem Leaf
1    24
1    6779
2    123334
2    5677777888899
3    00023
```

The protein content 41 is considered as

(a) An outlier because its Z-score is 3.01
(b) A normal value because its Z-score is 3.01
(c) An outlier because the maximum protein content is only 33
(d) A normal value because the average protein content is only 24.733
(e) An outlier because the median protein content is 27

17 It is believed that the extent to which employees are engaged with their workplace varies from Germany to United States. A study is conducted, on randomly selected employees from both countries, and showed that among USA employees 26% where engaged, among the German employees 36% are engaged, and 50% of the selected employees are German. What is the probability that the selected employee is German and Engaged?

(a) 0.180
(b) 0.310
(c) 0.680
(d) 0.419
(e) 0.581

18 The histogram below shows the frequency distribution of the total cost (in $) of a basket of assorted items in a random sample of hypermarkets
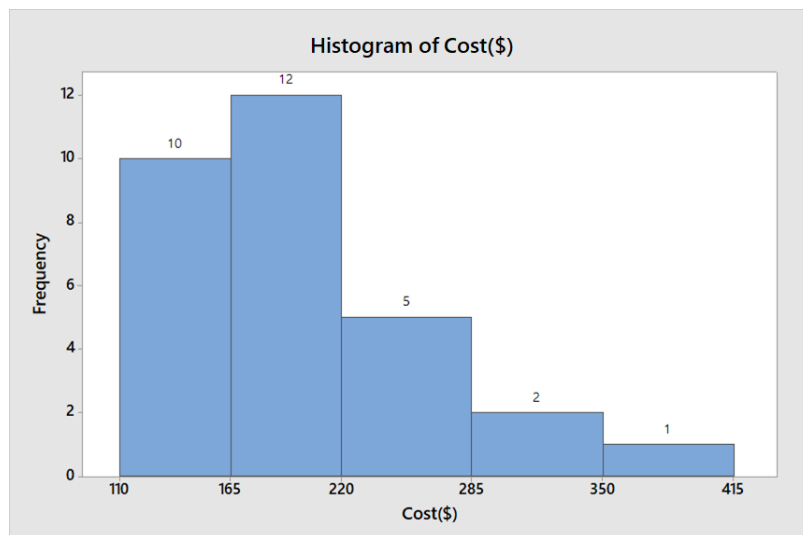
If the first class in the above histogram is ($110 , $165], then the cumulative percentage of hypermarkets with a cost more than $220 is

(a) 26.67
(b) 73.33
(c) 66.67
(d) 33.33
(e) 10.00

19 What is the preferred way for people to order fast food? A survey was conducted in 2009, but the sample sizes were not reported. Suppose the results, based on a sample of 100 males and 100 females, were as follows:

	GENDER		
DINING PREFERENCE	Male	Female	Total
Dine inside	21	12	33
Order inside to go	19	10	29
Order at the drive-through	60	78	138
Total	100	100	200

If a respondent is selected at random, what is the probability that is a male or prefers to order at the drive-through?

(a) 0.89
(b) 0.30
(c) 0.69
(d) 0.50
(e) 0.39

20 The table below is a contingency table for whether a household purchased a television with a faster refresh rate and whether the household purchased a Blu-ray disc player. If a household purchased a television with a faster refresh rate, what is the probability that it also purchased a Blu-ray disc player?

REFRESH RATE OF TELEVISION PURCHASED	PURCHASED BD PLAYER		
	Yes	No	Total
Faster	38	42	80
Standard	70	150	220
Total	108	192	300

(a) 0.475
(b) 0.267
(c) 0.127
(d) 0.274
(e) 0.733

Formula Page

Descriptive Statistics

- $\bar{x} = \frac{\sum x}{n}$

- $s = \sqrt{\frac{\sum x^2 - n\bar{x}^2}{n-1}}$

- Percentiles: $R_\alpha = \frac{\alpha}{100}(n+1) = i.d$ and $P_\alpha = X_{(i)} + d(X_{(i+1)} - X_{(i)})$

Probability

- $P(A \cup B) = P(A) + P(B) - P(A \cap B)$
- $P(A) + P(\bar{A}) = 1$

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