

CENTRAL UNIVERSITY



END OF SEMESTER EXAMINATION 2018

CENTRAL BUSINESS SCHOOL
DEPARTMENT OF BANKING AND FINANCE
SBFW 102 (3 CREDITS)
BUSINESS STATISTICS
LEVEL 100
JUNE, 2018
DURATION: 3 Hours

STUDENT ID No.....

INSTRUCTIONS

ANSWER ALL QUESTONS IN SECTION A AND ANY TWO IN SECTION B

DO NOT TURN OVER THIS PAGE UNTIL YOU HAVE BEEN TOLD TO DO SO BY THE INVIGILATOR

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SECTION A Answer all questions

1. The ages of eighteen (18) faculty members in a Business Department of the Novoya University are represented in a stemplot as follows:

3|2 4 8 9 9
4|0 3 5 6 9
5|3 4 7 8 9 9
6|3 8

What are the actual values in the third row data?

- A. 38 45 57
B. 5 3 4 7 8 9 9
C. 3 4 7 8 9 9
D. 53 54 57 58 59 59
2. A census
- A. is a study of a portion or part of the population
B. is a study of the entire population
C. is a body of facts that are in a format suitable for decision making.
D. is a portion, or part, of the population of interest.
3. To select a sample of undergraduate students in Ghana, a simple random sample of four regions was selected. From each of these four regions, a simple random sample of two polytechnics was selected. Finally, from each of these eight polytechnics, a simple random sample of 20 undergraduates was selected. The final sample consists of 160 under graduates. This is an example of :
- A. cluster sampling
B. systematic sampling
C. stratified sampling
D. multistage sampling
4. Population can be defined as,
- A. the science of collecting, organizing, presenting , analyzing, and interpreting data to assist in making more effective decisions
B. an item of interest that can take on many different numerical values .
C. the collection of all possible observations of a specified characteristic of interest.
D. the methods of organizing, summarizing, and presenting data in an informative way.

5. An equation that determines the relationship between two variables is
- A. Functional Equation
 - B. Complex Equation
 - C. Correlation Equation
 - D. Regression Equation
6. Which of the following is a measure of dispersion?
- A. Mean
 - B. Harmonic Mean
 - C. Mean deviation
 - D. Geometric mean
7. The standard deviation is:
- A. the square of the variance
 - B. the square root of the variance
 - C. square of the mean deviation
 - D. square of the mean.
8. Stratified sampling scheme can only be used when the population is
- A. Heterogeneous
 - B. Homogeneous
 - C. Large
 - D. Infinite
9. Which of these is an advantage of personal interview?
- A. Saves the researcher time and money.
 - B. High response rate
 - C. Respondents answer questions the way they understand them.
 - D. No interviewer-bias
10. The coefficient of determination measures,
- A. The percent of the variation in Y that is explained by the variation in X
 - B. The strength of the association between two variables.
 - C. How close the actual values are to the regression line.
 - D. The difference between a sample statistic and its corresponding population parameter.

11. A large mass of data can best be summarized pictorially by means of:

- A. the range
- B. the mean
- C. the frequency table
- D. a histogram

11. For a symmetric distribution, the mean, median and mode are

- A. insufficient information
- B. always different
- C. possibly the same, possibly different
- D. the same

12. Marital Status and Gender are examples of:

- A. Quantitative Variable
- B. Qualitative Variable
- C. Continuous Variable
- D. Discrete Variable

13. In a statistics class, 10 scores were randomly selected with the following results:

74, 72, 77, 77, 71, 68, 65, 77, 67, and 66. What is the modal score?

- A. 77.0
- B. 72.0
- C. 71.5
- D. 71.0

14. A violin student records the number of hours she spends practicing during each of nine consecutive weeks:-

6.0 5.0 4.0 7.0 5.0 7.0 8.0 1.0 6.0

What is the median number of hours spent practicing per week during this period?

- A. .0 hours
- B. 8.0 hours
- C. 6.0 hours
- D. 5.4 hours

15. If the mean, median and mode of a distribution are 7, 6, 5 respectively, then the distribution is:
- A. skewed negatively
 - B. not skewed
 - C. skewed positively
 - D. symmetrical
16. Consider these five values of a population: 8, 3, 7, 3, and 4. Determine the range.
- A. 4.0
 - B. 5.0
 - C. 1.0
 - D. 3.0
17. A Hypothesis is
- A. a statement about a population developed for the purpose of testing
 - B. a statement about the sample developed for the purpose of testing.
 - C. a statement about the value of the population parameter
 - D. a statement about the study.
18. In Linear Regression and Correlation an independent variable is
- A. the variable that is being predicted or estimated.
 - B. plotted on Vertical axis
 - C. the Output Variable.
 - D. a variable that provides the basis for estimation
19. Pearson's Product Moment Correlation Coefficient is used when data is in
- A. Nominal Scale and Ordinal Scale
 - B. Interval Scale and Ratio Scale
 - C. Ordinal Scale Interval Scale
 - D. Ratio Scale and Nominal Scale
20. Which of the following is a source of primary data?
- A. Personal investigation
 - B. Non Official Statistics
 - C. Official Statistics
 - D. Published statistics.

21. The sample standard deviation of the following sample of five numbers 3,3,3,3,3 is:
- A. 1
 - B. 3
 - C. 0
 - D. 11.25
22. The act of making an estimate of response within the observed range of the independent variable or inside the observed region of a set of independent variables is known as:
- A. Intrapolation
 - B. Exterpolation
 - C. Extrapolation
 - D. Interpolation
23. A given commodity is priced in different markets as follows: “four for one cedi”, “five for one cedi”, “and twenty for one cedi”. Find the average price per unit.
- A. 0.166 pesewas
 - B. 16.66 pesewas
 - C. 0.1 pesewas
 - D. 10 pesewas
24. Which of the following is a source of secondary data?
- A. Published statistics
 - B. Teams of investigators
 - C. Postal questionnaires
 - D. Personal investigation
25. Which of the following is a true statement?
- A. The mean is necessarily one of the original values.
 - B. A set of data has only one mean
 - C. The mean is not affected by extreme values.
 - D. In a grouped frequency distribution, the mean cannot be estimated.

26. Which of the following is an advantage of the postal questionnaire?
- A. Absence of Interviewer Bias
 - B. Time consuming and expensive.
 - C. Unrepresentativeness
 - D. High response rate.
27. The value of the coefficient of correlation lies in the range:
- A. $0 \leq r \leq +1$
 - B. $0 < r < +1$
 - C. $-1 \leq r \leq +1$
 - D. $-1 < r < +1$
28. The study of statistics is usually divided into two categories. Which of the following are the two categories?.
- A. Qualitative and Quantitative
 - B. Parameters and Statistics
 - C. Descriptive and Inferential
 - D. Census and Survey
29. When we are choosing a random sample and we place chosen units back into the population, we are:
- A. Sampling without Replacement
 - B. Sampling with Replacement
 - C. Using a Systematic Sample
 - D. Using a Voluntary Response Sample
30. Which of the following is an example of a continuous variable?
- A. Number of children in a family.
 - B. Gender
 - C. Race
 - D. Age
31. In finding the standard deviation we must first determine
- A. the median
 - B. the mean
 - C. kurtosis
 - D. skewness

32. If we wish to draw a sample of size 100 from a population of 2,000 using the systematic random sampling method, what would be the sampling interval?
- A. 100
 - B. 10
 - C. 20
 - D. 0.05
33. A(n) _____ is a graph of a cumulative distribution.
- A. Histogram
 - B. Scatter plot
 - C. Ogive plot
 - D. Frequency Polygon
34. In frequency distribution, the height and sharpness of the peak relative to the rest of the data are measured by a number called
- A. kurtosis.
 - B. coefficient of variation
 - C. coefficient of skewness
 - D. coefficient determination
35. Sample size is
- A. the number of items/persons/objects that must be in the sample.
 - B. the number of items/persons/objects that must be in the sampling frame
 - C. the number of items/persons/objects that must be in the population.
 - D. the number of items/persons/objects that must be in the census.
36. The annual dividends, in percent, of four oil shares are: 4.91, 5.75, 8.12, and 21.6. What is the geometric mean dividend?
- A. 10.095
 - B. 6.935
 - C. 21.60
 - D. 8.389

37. In constructing a good questionnaire which of the following must be avoided?
- A. The questionnaire should be as brief as possible.
 - B. Questions should be short and ambiguous.
 - C. Questions should be in logical sequence
 - D. The questions should be adequate to obtain the information required.
38. Methods of organizing, summarizing and presenting data in an informative way is known as
- A. Descriptive Statistics
 - B. Informative Statistics
 - C. Narrative Statistics
 - D. Inferential Statistics
39. Spearman's rank coefficient of correlation is used when data is in the
- A. Nominal Scale
 - B. Ratio Scale
 - C. Ordinal Scale
 - D. Interval Scale
40. A portion, or part, of the population of interest is known as
- A. Survey
 - B. Statistics
 - C. Parameter
 - D. Sample
41. A sampling technique where the samples are gathered in a process that does **not** give all the individuals in the population equal chances of being selected is known as
- A. Random Sampling
 - B. Non Random Sampling
 - C. Probability Sampling
 - D. Fair Sampling
42. Consider the data set 1 3 2 3 5. What is the sample average?
- A. 3
 - B. 2
 - C. 2.5
 - D. 2.8

43. A table has six parts. Which of the following is not a part of a table?

- A. Table Number
- B. Page Number
- C. Table Title
- D. Source Note

44. If we wish to draw a sample of size 100 from a population of 2,000 using the stratified random sampling method, what would be the sampling fraction?

- A. 100
- B. 10
- C. 20
- D. 0.05

45. A sample of 10 observations is selected from a normal population for which the population's standard deviation is known to be 5. The sample mean is known to be 20. The 95% confidence for the population mean is,

- A. $20 \pm 1.96 \frac{5}{\sqrt{10}}$
- B. $20 \pm 2.58 \frac{5}{\sqrt{10}}$
- C. $20 \pm 1.645 \frac{5}{\sqrt{10}}$
- D. $20 \pm 0.95 \frac{5}{\sqrt{10}}$

46. The set of all possible sample points (experimental outcomes) is called,

- A. the sample space.
- B. the sampling frame.
- C. sampling interval.
- D. sample statistics.

47. A population characteristic, such as population mean, is called

- A. a parameter.
- B. a statistic.
- C. descriptive statistic.
- D. Inferential statistic.

48. When the characteristic or variable being studied is numeric it is called:

- A. Discrete variable
- B. Continuous variable
- C. Quantitative variable
- D. Attribute

49. Of 180 calculators sampled, 5 were defective. The proportion of defects is found by:

- a. $\frac{\text{Number of defects in sample}}{\text{Number sampled}}$
- b. $\frac{\text{Number sampled}}{\text{Number of defects}}$
- c. $n = \left(\frac{z \cdot s}{E}\right)^2$
- d. $\frac{X_1 + X_2}{n_1 + n_2}$

50. Which of the following is **not** a potential source of error and bias in using secondary data:

- A. Sampling error
- B. Response error
- C. Non-response error
- D. Standard error

51. Which of the following would constitute a set of discrete data?

- A. Time taken to travel to work each day over one year.
- B. Weights of a consignment of tins of plum tomatoes.
- C. Number of cars passing a census point each minute over a 3-month period.
- D. Age of applicants applying for catering jobs over a 3-month period in a large hotel chain

52. A card was drawn from a pack of 52 playing cards. What is the probability that it is an ace?

- a. $\frac{1}{13}$
- b. $\frac{1}{54}$
- c. $\frac{4}{13}$
- d. $\frac{1}{4}$

53. An investment analyst judges that a particular investment has a probability of 0.6 of returning a profit within two years. This is an example of

- A. classical probability
- B. subjective probability
- C. empirical probability
- D. relative frequencies

54. If the lower and upper quartiles of a frequency distribution were 8 and 15, the quartile deviation of the distribution would be

- A. 7
- B. 3.5
- C. 11.5
- D. 23

55. For a particular distribution of wages, the arithmetic mean was computed to be GHS 25,000, the median GHS 25,000, and the mode also GHS 25,000. The standard deviation was GHS 1,000. What is the coefficient of skewness?

- A. 0
- B. 1.0
- C. 0.1
- D. 25,000

56. Two coins are tossed. What is the probability that both will land tail up?

- A. 0.5
- B. 0.25
- C. 1.0
- D. 0.2

57. The Board of Directors of a company consists of 3 accountants, 3 managers, and 2 engineers. A planning committee of 3 is chosen at random from the Board. What is the probability that all 3 members of the sub-committee are accountants?

A. $\frac{3}{8}$

B. $\frac{3}{56}$

C. $\frac{1}{8}$

D. $\frac{1}{56}$

58. In a set of 10 scores the value 2 occurs three times, the value 4 occurs twice, 6 occurs twice, and 7 occurs three times. What is the mean of the scores?

A. $\frac{2+2+6+7}{4}$

B. $\frac{2+4+6+7}{10}$

C. $\frac{3x2+2x4+2x6+3x7}{4}$

D. $\frac{3x2+2x4+2x6+3x7}{10}$

59. Which of the following is not a characteristic of the normal probability distribution and its accompanying normal curve?

A. The normal curve is bell-shaped

B. The normal probability distribution is symmetrical about its mean.

C. The normal curve falls off smoothly in either direction from the central value.

D. The random variable is the result of counting the number of successes in a fixed number of trials.

60. A Type 1 Error is committed when;

- A. A correct H_0 is accepted
- B. A correct H_0 is rejected
- C. An H_1 is accepted
- D. An H_1 is rejected

(60 Marks)

Section B. Answer two questions

1. (a) A brokerage survey reports that 30% of individual investors have used a discount broker; that is, one which does not charge the full commission. In a random sample of nine individuals, calculate the probability:

- (i) Exactly two of the sampled individuals have used a discount broker? (5 Marks)
- (ii) None of them have used a discount broker? (5 Marks)

(b) Ms. Bergen is a loan officer at Coast Bank and Trust. Based on her years of experience, she estimates that the probability is .025 that an applicant will not be able to repay his or her installment loan. Last month she made 40 loans.

Calculate,

- (i) the probability that 3 loans will be defaulted? (4 Marks)
- (ii) the probability that at least 3 loans will be defaulted? (6 Marks)

(Total 20 Marks)

2. A cola-dispensing machine is set to dispense on average 7.0 ounces of cola per cup.. The standard deviation is 0.10 ounces. Calculate the probability that a machine will dispense:

- a. Between 7.10 and 7.25 ounces of cola? (5 Marks)
- b. 7.25 ounces of cola or more? (5 Marks)
- c. Between 6.8 and 7.25 ounces of cola? (5 Marks)

d. How much cola is dispensed in the largest 1 percent of the drinks? (5 Marks)

(Total 20 Marks)

3. a) Explain terms:

i) Interpolation (2 Marks)

ii) Extrapolation (2 Marks)

b) The following table shows the results of 8 students in “Business Mathematics” and “Statistics”:

Business Mathematics [%]	68	54	19	72	50	44	92	37
Statistics [%]	51	76	32	85	62	25	74	59

i) Rank the results of the 8 students in Business Mathematics and Statistics. (4 Marks)

ii) Calculate the value of Spearman’s rank correlation coefficient. (9 Marks)

iii) Interpret your result in b. (3 Marks)

(Total 20 Marks)

4. A sample of 50 antique dealers in Ghana revealed the following sales last year:

Sales (\$ thousands)	Number of Firms
100 up to 120	5
120 up to 140	7
140 up to 160	9
160 up to 180	16
180 up to 200	10
200 up to 220	3

a) Draw a histogram of the distribution. (3 Marks)

b) Calculate:

(i) the mean; (4 Marks)

(ii) the mode; (3 Marks)

(iii) the standard deviation; (6 Marks)

(iv) the coefficient of skewness;
of the distribution. (2 Marks)

c) Comment on the mean, the standard deviation and the skewness of the distribution. (2 Marks)

(Total 20 Marks)

$$Sk. = \frac{\text{mean} - \text{mode}}{S.D}$$

$$Sk. = \frac{3(\text{mean} - \text{median})}{S.D}$$

$$\text{Kurtosis} = \frac{\sum_{i=1}^N (Y_i - \bar{Y})^4}{(N-1)S^4}$$

REGRESSION AND CORRELATION

$$a = \frac{\sum bY - m_b \sum Y}{n} = \frac{\sum bY - m_b \sum Y}{n} = \frac{n \left(\sum xy \right) - \left(\sum x \sum y \right)}{n \left(\sum x^2 \right) - \left(\sum x \right)^2}$$

$$\rho = 1 - \frac{6 \sum d_i^2}{n(n^2 - 1)}$$

$$r_{xy} = \frac{n \sum XY - \sum X \sum Y}{\sqrt{[n \sum X^2 - (\sum X)^2][n \sum Y^2 - (\sum Y)^2]}}$$

PROBABILITY

$$P(A \text{ or } B) = P(A) + P(B)$$

$$P(A \text{ or } B \text{ or both}) = P(A) + P(B) - P(A \text{ and } B)$$

$$P(A \text{ and } B) = P(A)P(B)$$

$$P(A \text{ and } B) = P(A)P(B|A)$$

$$P(A_1|B) = \frac{P(A_1)P(B|A_1)}{P(A_1)P(B|A_1) + P(A_2)P(B|A_2)}$$

$$n! = n(n-1)(n-2) \dots 3.2.1$$

$${}^n P_r = \frac{n!}{(n-r)!}$$

$${}^n C_r = \frac{{}^n P_r}{r!} = \frac{n!}{r!(n-r)!}$$

$$\sigma = \sqrt{npq}$$

Continuity Correction

$$x \pm .5$$

$$z = \frac{x + .5 - np}{\sqrt{npq}}$$

Confidence Intervals

$$\bar{x} \pm \frac{\sigma}{\sqrt{n}}$$

$$\bar{x} \pm z \frac{s}{\sqrt{n}}$$

$$p \pm z \sqrt{\frac{p(1-p)}{n}}$$

Test Statistics

$$z = \frac{\bar{x} - \mu}{\sigma/\sqrt{n}}$$

$$z = \frac{p - \pi}{\sqrt{(p)(1-p)}/\sqrt{n}}$$

Index Numbers

Simple Indexes

Expected Value

$$\mu = E(x) = \sum [xP(x)],$$

Variance

$$\sigma^2 = \sum [(x - \mu)^2 P(x)]$$

$$\sigma^2 = \sum x^2 P(x) - \mu^2$$

Binomial Distribution

$$P(x) = \frac{n!}{x!(n-x)!} \pi^x (1 - \pi)^{n-x}$$

Poisson Distribution

$$P(x) = \frac{\mu^x e^{-\mu}}{x!}$$

Normal Distribution

$$z = \frac{X - \mu}{\sigma} \quad \sigma \neq 0$$

Normal Approximation to the Binomial Distribution

$$\mu = np$$

MEASURES OF CENTRAL TENDENCY

$$\bar{X} = \frac{\sum_{i=1}^N x_i}{N}$$

$$\text{Mode} = L_1 + \left(\frac{\Delta_1}{\Delta_1 + \Delta_2} \right) \times c$$

$$\bar{x} = \frac{\sum fx}{\sum f}$$

GM=

$$\sqrt[n]{(x_1)(x_2)\dots(x_n)}$$

$$\text{Median} = L_1 + \left(\frac{\frac{N}{2} - (\sum f)_1}{f_{\text{median}}} \right) \times c$$

Hamonic Mean =

$$\frac{1}{H} = \frac{1}{r_1} + \frac{1}{r_2} + \dots + \frac{1}{N}$$

MEASURES OF DISPERSION

$$\text{Range} = X_{\max} - X_{\min}$$

$$\text{Q.D.} = \frac{Q_3 - Q_1}{2}$$

$$\text{Mean Deviation} = \frac{\sum f |x - \bar{x}|}{\sum f}$$

$$\sigma = \sqrt{\frac{\sum fx^2}{\sum f} - \left(\frac{\sum fx}{\sum f} \right)^2}$$

$$s^2 = \frac{\sum fx^2 - \frac{(\sum fx)^2}{\sum f}}{n-1}$$

$$c.v = \frac{\sigma}{\bar{x}} \times 100$$

$$\text{Sk} = \frac{\sum_{i=1}^N (Y_i - \bar{Y})^3}{(N-1)s^3}$$

$$P = \frac{P_t}{P_0} \times 100$$

$$P = \frac{\sum P_i}{n}$$

$$P = \frac{\sum P_t}{\sum P_0} \times 100$$

Weighted Indexes

$$P = \frac{\sum P_t q_0}{\sum P_0 q_0} \times 100$$

$$P = \frac{\sum p_t q_t}{\sum p_0 q_t} \times 100$$

Fisher's Ideal Index = $\sqrt{(\text{Laspeyres' index})(\text{Paasche's index})}$

