BRAC University

Fall Semester-2022

Mid-term Exam Sample Question Bank

STA-201: Elements of Statistics and Probability

1. The owner of a departmental store wants to know the weekly requirements of different categories of T-shirts demanded by the customers. For this, he collected information on the number of different categories of T-shirts sold by the store in the last week. The data obtained by the store are

   M, S, L, XL, M, M, S, S, S, M, M, XL, XL, L, M, M, M, M, S, S, L, L, XL, M, M, S, S, L, L, S, M, M, L, L, M, M, L, XL, S, S, S, M, M, M, S, XL, L, L, M, M, M, M, S, M, M. S, XL, L.

   Here, S, M, L, and XL denote the small, medium, large and extra-large sizes of T-shirts respectively. Construct a frequency distribution Table for the above categorical data and find the dominant size of the T-shirt.

2. The following data give the number of shoes in different sizes sold by a shop last week. Here, S, M, & L denote the small, medium, large size.
   L, M, S, M, M, M, S, L, L, S, M, M, S, L, M, M, S, L, S, M, M, M, S, L, S, S, S, S, M, M, M, L, S, M, M, M, L, L, S, M, S, M, L, M, L, M, M, L, M, M, L, S, S, M.

   i) Construct a frequency table.
   ii) Which one is the most preferable size?
   iii) Construct a bar and pie chart.

   The mode is the smallest value, and it is located to the left on the distribution.

3. The following data relate to the audit time of 20 clients.

   10, 15, 20, 28, 13, 18, 24, 29, 12, 16, 23, 34, 14, 17, 22, 17, 21, 16, 18, 19.

   a) Construct a stem and leaf plot for the above data and find the mode.
   b) For the given data construct a suitable frequency distribution table and hence draw Histogram & a frequency polygon.
   c) Compare the Mode obtained from the stem and leaf plot and Histogram.
   d) Are there any outliers in this data? *Q1 -+ 1.5(IQR)*

4. The following data set represents the scores on intelligence quotient (IQ) examinations of 40 sixth-grade students at a particular school:

114	122	103	118	99	105	134	125	117	106
109	104	111	127	133	111	117	103	120	98
100	130	141	119	128	106	109	115	113	121
100	130	125	117	119	113	104	108	110	102

a. Organize the data in classes such as 90 – 100, 100 – 110, and so on.
b. Present the data set in a frequency histogram.

5. The international Rhino Federation estimates that there are 25280 rhinoceroses living in the wild in Africa and Asia. A breakdown of the number of rhinos of each species is reported in the accompanying table.

Rhino Species	Population Estimate
White rhino	18000
Black rhino	4240
Greater One-horned rhino	2800
Sumatran Rhino	200
Javan Rhino	40
Total	25280

a. Construct a relative frequency table for the data.
b. Display the frequencies in a bar graph.
c. Display the frequencies in a pie chart.
d. What proportion of the 25280 rhinos are White rhinos? Black?

6. You are working for the transport manager of a "call centre" which hires cars for the staff. You are interested in the weekly distances covered by these cars. Kilometers recorded for a sample of hired cars during a given week yielded the following data:

Kilometers Covered	Number of cars	Kilometers Covered	Number of cars
100-110	4	150-160	8
110-120	0	160-170	5
120-130	3	170-180	0
130-140	7	180-190	2
140-150	11		

a) Find average distances by suitable method. 145km
b) Draw an ogive curve and find the median, Q2, P50, and D5.
c) Find graphically the number of cars that covered less than 165 km in the week.

7. The distribution of the number of e-mails received by a person in different days in given below:

Class interval of emails	4-6	6-8	8-10	10-12	12-14	Total
No. of days, f	15	18	7	8	2	50

i)   Find the mean number of e-mails received per day by the person.
ii) What is the mode, and the median number of e-mails?
iii) Calculate Q1, D9, and P25 of the distribution.
iv) Locate Mode graphically and verify with previous.

8. The distribution of life length (in hours) of electric insulation observed from different sample units of similar electrical items is given below:

Class interval of life length:	600-650	650-700	700-750	750-800	800-850	Total
No. of sample unit, f	15	20	28	32	5	100

i)   Calculate the average life length of electric insulation per item by step deviation method.
ii) Calculate median of the life length of electric insulation and also find mode using the mean and median
iii) Find Q3, D4, and P60 of the distribution of life length.

9. The distribution of export of garments (000 pieces) in six months from different industries in shown below:

Class interval of pieces of garments	50-60	60-70	70-80	80-90	90-100	Total
No. of industries, f	8	18	32	22	20	100

i)   Find the percentage of industries which export 70000 and above pieces. 74%
ii) Find arithmetic mean, geometric mean & harmonic mean number of pieces per industries.
iii) Calculate median, and mode of pieces per industries.

10. By using the following information of 2 factories-

	Factory-A	Factory-B
No. of employees	700	500
Average daily wages	2000 Tk.	1800 Tk.
Standard deviation of wages	100 Tk.	120 Tk.

i)   Which factory pays larger amounts as daily wages? A
ii)   What is the average daily wage for the workers of two factories?. 1916.67
iii)   In which factory there is greater variability in individual salary? Analyze with logic.   A=5, B=6.67

11. The distribution of emission of Sulphur oxides (in tons) from an industrial plant in different days is given below:

Class interval of emission of Sulphur oxide:	6-10	10-14	14-18	18-22	22-26	Total
No. of days, f	14	20	8	5	3	50

a) Find percentage of days in which emission of Sulphur oxide is less than 14 tons.
b) Find an appropriate measure of dispersion of the distribution of emission of Sulphur oxide.

12. The distribution of production of electricity (in 000 MW) in different days is shown below:

Class interval of production	2.0-2.4	2.4-2.8	2.8-3.2	3.2-3.6	3.6-4.0	Total
Number of days, f	5	18	28	42	7	100

i)   Calculate standard deviation of the production of electricity.
ii)   Find Coefficient of the distribution of production of electricity.

13. Lives of two models of computer in recent survey are given below:

Life in year	0-2	2-4	4-6	6-8	8-10
Dell	5	13	20	7	5
Asus	2	7	12	20	9

i)   Which model has more average life?
ii)   Which model has the greater variation in life?
iii)   A person wants to buy a computer, which one he will prefer and why?

14. The number of nurses working in different private clinics are shown below:
Number of nurses (x): 8, 15,10, 11,15

Calculate:
i)   Variance of number of nurses.
ii)   Coefficient of variation (C.V) of number of nurses.

15. Fill in the blanks:

(*i*) Quantitative Variables are of two kinds ... ... and ... ... [discrete and continuous]

(*ii*) ... ... is the process of arranging data into groups according to their common characteristics. [classification]

(*iii*) In chronological classification, the data are classified on the basis of ... ... [time]

(*iv*) ... ... classification means the classification of data according to location. [Geographical]

(*v*) Class-mark (mid-point) is the value lying half-way between ... ... [the upper and the lower limits of the class]

(*vi*) According to Sturges' rule, the number of classes (*k*) is given by: $k =$ ... ... [$1 + 3.322 \log_{10} N$; N is total frequency]

(*vii*) The magnitude of the class (*i*) is given by: $i =$ ... ... [(upper limit – lower limit) of the class]

(*viii*) ... ... of data is a function very similar to that of sorting letters in a post office. [Classification]

(*ix*) Different bases of classification of data are ... ... [geographical, chronological, qualitative and quantitative.]

(*x*) The data can be classified into ... ... and ... ... type classes. [inclusive and exclusive]

(*xi*) While forming a grouped frequency distribution, the number of classes should usually be between ... ... [5 and 25]

(*xii*) In exclusive type classes, the upper limit of the class is ... ... [not included in the class]

(*xiii*) In the continuous classes 0—5, 5—10, 10—15, 15—20 and so on, the class 15—20 means that the variable *X* takes the values ... ... [15 and more but less than 20 i.e., $15 \leq X < 20$.]

(*xiv*) Two examples of discrete variable are ... ... and ... ... and continuous variable are ... ... and ... ... [marks in a test and number of accidents and heights in inches and weights in kgs]

(*xv*) The classes in which the lower limit or the upper limit are not specified, are known as ... [open end classed]

(*xvi*) The difference between the upper and the lower limits of a class gives ... ... of the class. [the width or the magnitude]

(*xvii*) The number of observations in a particular class is called the ... ... of the class. [frequency]

(*xviii*) If the data values are classified into the classes 0—9, 10—19, 20—29, and so on and the frequency of the class 20—29 is 12, it means that ... ... [there are 12 observations taking values between 20 and 29, both inclusive i.e., $20 \leq X \leq 29$]

Ans. (*i*) discrete, continuous, (*ii*) classification. (*iii*) time. (*iv*) geographical. (*v*) the upper and the lower limits of the class. (*vi*) $k = 1 + 3·322 \log_{10}N$; *N* is total frequency. (*vii*) $i =$ (upper limit – lower limit) of the class. (*viii*) classification. (*ix*) geographical, chronological, qualitative and quantitative. (*x*) inclusive, exclusive. (*xi*) 5 and 25. (*xii*) is not included in the class. (*xiii*) 15 and more but less than 20 *i.e.,* $15 \leq X < 20$. (*xiv*) marks in a test, number of accidents; height in inches, weight in kgs. (*xv*) open end classes. (*xvi*) the width or the magnitude. (*xvii*) frequency. (*xviii*) there are 12 observations taking values between 20 and 29, both inclusive *i.e.,* $20 \leq X \leq 29$.

16.   **a. Classify each variable as qualitative or quantitative:**

   i. Marital status of nurses in a hospital

   ii. Time it takes to run a marathon

   iii. Weights of lobsters in a tank in a restaurant

   iv. Colors of automobiles in a shopping center parking lot

   v. Ages of people living in a personal care home

   b. Classify each variable as discrete or continuous:

   i. Number of pizzas sold by Pizza Express each day

   ii. Lifetimes (in hours) of 15 iPod batteries

   iii. Weights of the backpacks of first graders on a school bus

   iv. Number of students each day who make appointments with a mathematics tutor
        at a local college

   v. Blood pressures of runners in a marathon