Statistics BHM: Pre-Board Examination 2073

Set A

NCCS College

Group A (1x 10 = 10)

Brief answer question: Attempt all questions

1. Write briefly any four differences between random sampling and non-random sampling?
2. A sample of 10 observations gave the a.m. of 13 and variance of 4. Later it was found that observation 21 was wrongly entered as 12. Find the corrected mean.
3. What are major sources of data? Write three main sources of primary data.
4. A software company has 20 laptops in its inventory, 5 of which are defective. A quality assurance team randomly selects 2 laptops for testing. What is the probability that both laptops are defectives?
5. Students in a large accounting class were asked to rate course by assigning score of 1,2,3,4, or 5 to the course. A higher score indicates that the students received greater value from the course. The accompanying table shows proportion of students rating the course in each category.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Rating | 1 | 2 | 3 | 4 | 5 |
| Proportion | 0.07 | 0.19 | 0.28 | 0.30 | 0.16 |

Find the standard deviation of ratings

1. Suppose a sample of 50 data pairs shows a sample correlation coefficient of r = 0.6. Test the significance of correlation coefficient using probable error.
2. For a moderately skewed data, mean is 100, coefficient of variation is 35 %, and Karl Pearson’s coefficient of skewness is 0.2, find the median of distribution.
3. Define variables and write its types with one example of each.
4. If regression coefficient of Y on X is 3/4 and regression coefficient of X on Y I s 2/5, find the correlation coefficient between two variables.
5. If interquartile range is 2, tenth and ninetieth percentiles are 16 and 24 respectively, find the coefficient of kurtosis

Group B (3 x 5 = 15)

Short Answer Questions: Attempt any five questions

1. The following are the scores of 30 college students on a statistics test.

75 52 80 96 65 79 71 87 93 95  
69 72 81 61 76 86 79 68 50 92  
83 84 77 64 71 87 72 92 57 98

Construct a stem-and-leaf display and comment on the shape of the distribution.

1. The analysis of monthly wages paid to the workers in two firms A and B, belonging to the same industry gives the following results.

|  |  |  |
| --- | --- | --- |
| Measures | Firm A | Firm B |
| No. of wage earners | 500 | 600 |
| Average monthly wages | Rs 586 | Rs 575 |
| Variance of wages | Rs 81 | Rs 100 |

1. What is the combined mean of two firms?
2. What is the combined variance of two firms?
3. A web server in a distributed system processes requests with a 90% success rate (i.e., no errors). If 12 independent requests are sent to the server, answer the following:
4. What is the probability that exactly 10 requests are processed successfully?
5. What is the probability that at least 11 requests are processed successfully?
6. Calculate the expected number of successful requests and the variance.
7. The following information is related to X = Advertisement expenditure and Y = sales.

|  |  |  |
| --- | --- | --- |
| Descriptive Measures | Advertisement Expenditure (Rs Lakshs) | Sales (Rs Lakhs) |
| Mean | 10 | 90 |
| Standard Deviation | 3 | 12 |
| Correlation Coefficient | 0.8 | |

Fit a regression equation of advertisement expenditure on sales target to find the advertisement expenditure if the company wants to attain a sale target of Rs 120 lakhs?

1. From the following distribution of marks of 500 students of a college, find the minimum marks obtained by the top 10 % students.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Marks | Below 20 | 20 – 40 | 40 - 50 | 50 - 60 | 60 – 80 | 80 -100 | Total |
| No. of students | 50 | 100 | 150 | 90 | 60 | 50 | 500 |

1. The length of hospitalization of patients having certain ailment is given below:

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Length of stay | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| No. of patients | 2 | 4 | 6 | 9 | 12 | 8 | 6 | 5 | 4 | 3 | 1 | 1 |

Find the median and mean of the distribution. Compare mean vs median and state which type of skewness is found in the data.

Group C (3 X 5 = 15)

Long Answer Questions (Attempt any three questions)

1. If the heights of 300 students are normally distributed with mean 68 inches and standard deviation of 3 inches. Assume the measurements to be recorded to the nearest inch.
2. How many students have height greater than 72 inches?
3. What percentage of students have height less than or equal to 62 inches?
4. 80 % of the students will be above what X value?
5. Mr. Santosh is selected for interview for two posts. For the first post, there are 8 candidates and for the second post there are 7 candidates. If the selection of each candidate is equally likely, find the chance that Mr. Santosh will be selected for (a) none of the post, (b) both of the post and (c) at least one post.
6. From the following distribution of marks of 500 students of NCCS college calculate the coefficient of kurtosis and interpret the results.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Marks | 0-20 | 20-40 | 40-50 | 50-60 | 60-80 | 80-100 |
| No. of students | 50 | 100 | 150 | 90 | 60 | 50 |

1. A professor wants to analyze the relationship between students’ study hours and their final exam scores. The data for 10 students is shown below:

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Student | A | B | C | D | E | F | G | H | I | J |
| Study Hours (X) | 15 | 10 | 12 | 8 | 10 | 14 | 9 | 12 | 10 | 8 |
| Exam Score (Y) | 85 | 75 | 80 | 65 | 70 | 90 | 78 | 82 | 75 | 60 |

Compute Spearman’s correlation coefficient and interpret the result

Group D (1 x 20 = 20)

Comprehensive Answer Questions

21. The data on the income and expenditure of people of certain locality is given below.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Expenditure (Rs) | Income (Rs) | | | | |
| 0-500 | 500-1000 | 1000-1500 | 1500-2000 | 2000-2500 |
| 0-400 | 12 | 6 | 8 |  |  |
| 400-800 | 2 | 18 | 4 | 5 | 1 |
| 800-1200 |  | 8 | 10 | 2 | 4 |
| 1200-1600 |  | 1 | 10 | 2 | 1 |
| 1600-2000 |  |  | 1 | 2 | 3 |

1. Find the correlation coefficient between Income vs Expenditure
2. Find the regression equation of expenditure on income
3. Find the coefficient variation of income and expenditure