



Biostatistics

Term Examination

Time - 3 Hour

MM-70

The question paper contains 4 printed pages.

Note:

1. Kindly attach the question paper with the answer sheet at the time of submission of answer sheet.
2. All sections are compulsory. Attempt any 5 questions from section C.
3. Marks are indicated against each question.

Section-A

Kindly tick (✓) against the correct option.

(4 x 1 mark = 4 marks)

- i. A study was conducted in America to find out the proportion of blacks and white Americans in California. This variable chosen is:
 - a) Nominal
 - b) Ordinal
 - c) Interval
 - d) Ratio
- ii. Mean value of weight of a group of 10 boys was found to be 18.2 kg. Later it was found that weight of one of the boys was wrongly recorded as 2 kg that should have been 20 kg. The true mean weight of the group is:
 - a) 18.2 kg
 - b) 20.2 kg
 - c) 16.4 kg
 - d) 20 kg
- iii. If N is total observations and k is number of observations in a class, the angle for this class is given by:
 - a) $(360 \times k)/N$
 - b) $(360 \times N)/k$
 - c) $(N \times k)/360$
 - d) $(360)/(N \times k)$
- iv. Serum cholesterol levels for two groups of Americans were recorded in 1989. The mean cholesterol levels of the two groups were compared. To determine whether the measurements were significantly different or not, the most appropriate statistical test would be:
 - a) Chi-square test
 - b) Correlation analysis
 - c) F test (ANOVA)
 - d) Student's t test
 - e) Regression analysis

Kindly fill in the blanks for the following:

(3 x 1 mark = 3 marks)

- v. The birth weights in a hospital are to be presented in a graph. This is best done by a _____.
- vi. There are 50 individuals in population and they have same hemoglobin level that is 14g/dL. As there is no variability, the standard deviation will be _____.
- vii. For a skewed distribution, _____ may not be an appropriate measure of central tendency.

Kindly write True or False against the statement:

(3 x 1 mark = 3 marks)

- viii. A normal distribution curve is based mainly on mean and sample size.
- ix. When proportions of more than two groups are to be compared Chi-squared test is used.
- x. The value of correlation coefficient lies between -1 to +1.

Section-B

Define any four from the following:

(4 x 2.5 marks= 10 marks)

- Biostatistics
- Levels of measurement (Types of scale)
- Describe mean with its merits and demerits
- Two types of errors in hypothesis testing
- Normal distribution
- Steps followed in testing of hypothesis
- Chi squared test

Section-C

1. The heights (in inches) of 30 adult males are listed below:

70	72	71	70	69	73	69	68	70	71
67	71	70	74	69	68	71	71	71	72
69	71	68	67	73	74	70	71	69	68

Summarize the major features of the above data set by calculating:

- The mean
- The median
- The standard deviation
- The coefficient of variation

(2.5 marks)

(2.5 marks)

(2.5 marks)

(2.5 marks)



2. A study was conducted to estimate the average height of adult women in the United States. Analysis of the study data revealed that height of adult women in the United States as per the sample is normally distributed with a mean of 63.5 inches and a standard deviation of 2.5. What proportion of these women would you expect to have height:
- a) Greater than 60 inches (3 marks)
 - b) Less than 65 inches (3 marks)
 - c) Between 62 and 68 inches (4 marks)
3. The proportion of U.S. residents that are lactose intolerant is believed to be about 0.10. If this is correct and we randomly select 10 people from the U.S. population, what is the probability that there are:
- a) No lactose intolerant people in the sample (2 marks)
 - b) More than 3 lactose intolerant people in the sample (4 marks)
 - c) Less than 7 lactose intolerant people in the sample (4 marks)
4. In a study of 60 years old women with glaucoma, blood pressure level of 200 women were measured and it is found that the data was normally distributed with mean blood pressure level 140 mmHg, and SD 25mm Hg. Construct a 95% and 99% confidence interval for the population mean blood pressure and interpret the result. (10 marks)

5. There was a study of the bacteriological efficacy of clarithromycin vs penicillin, in acute pharyngotonsillitis in children by Streptococcus Beta Haemolytic Group A. The results are shown below:

Drug	Cure	Not cure	Total
Clarithromycin	91	9	100
Penicillin	82	18	100
Total	173	27	200

Test whether there are differences between bacteriological efficacy between the two treatments at $\alpha = 5\%$? (10 marks)

6. In two wards for elderly women in a geriatric hospital the following levels of haemoglobin were found:
 Ward A: 12.2, 11.1, 14.0, 11.3, 10.8, 12.5, 12.2, 11.9, 13.6, 12.7, 13.4, 13.7 g/dl.
 Ward B: 11.9, 10.7, 12.3, 13.9, 11.1, 11.2, 13.3, 11.4, 12.0, 11.1 g/dl.
 Test whether haemoglobin level are different for Ward A and Ward B at $\alpha = 0.05$. (10 marks)
7. Suppose the Acme Drug Company develops a new drug, designed to prevent colds. The company states that the drug is equally effective for men and women. To test this claim, they choose a simple random sample of 100 women and 200 men from a population of 100,000 volunteers. At the end of the study, 38% of the women caught a cold; and 51% of the men caught a cold. Based on these findings, can we reject the company's claim that the drug is equally effective for men and women? Use a 0.05 level of significance. (10 marks)



8. The age and blood pressure of 10 women are:

Age	56	42	36	47	49	42	60	72	63	55
Blood Pressure	147	125	118	128	145	140	155	164	149	150

- a) Find the regression equation of blood pressure on age.(5 marks)
b) Estimate the blood pressure of woman whose age is 45 years.(5 marks)

