Biostatistics Dec 11

Con. 6481-11. (REVISED COURSE) MP–3607

(3 Hours) Total Marks : 100

N.B. : (1) Attempt total five (05) questions.
(2) All questions carry equal marks.
(3) Question number 01 is compulsory.
(4) Appropriate statistical tables can be used.
(5) Non Programmable Scientific calculator can be used.

Q-01. Sem-VII (Biom) Dec.2011 (Bio-Statistics) (Biomedical)

(a) Find mean deviation about Mean and Median for the following data: 100, 150, 200, 250, 360, 490, 500, 600, 671, Also calculate coefficient of mean deviation. 05

(b) In four ICDS projects, 20% of children fewer than 6 years of age were found to be severely malnourished, i.e. in grades III & IV. If only 4 children were selected at random from of four projects, what is the probability of 4, 3, 2, 1 and 0 being severely malnourished? 05

(c) Fit the curve $y = ax^b$ to the following data: 05

x :	5	10	15	20	25	30	35
y :	2.76	3.17	3.44	3.64	3.81	3.95	4.07

(d) The National health and nutrition survey of 1976-80(A-1) found that the mean serum cholesterol level for US males aged 20-74 years was 211. The SD was approximately 90. Consider the sampling distribution of sample mean based on samples of size 50 drawn from this population of males. What is the mean and standard error of the sampling distribution? 05

Q 02.

(a) State central limit theorem and hence find the probability that the cranial length will have a mean greater than 190 mm, where the cranial length in a random sample of size 10 from this population is approximately normally distributed with a mean of 185.6 mm and a SD of 12.7 mm? 06

(b) A random sample of 16 observations drawn from a normal population showed a mean of 41.5 inch and the sum of squares of deviations from this mean is equal to 135 sq inches. Show that the assumption of a mean of 43.5inches for the population is not reasonable. Obtain 95%, 99% confidence interval for the same. 06

(c) The following table shows the weights X_1 to the nearest pound (lb), the heights X_2 to the nearest inch (in), and the ages X_3 to the nearest years of 12 boys.

Weight X_1	64	71	53	67	55	58	77	57	56	51	76	68
Height X_2	57	59	49	62	51	50	55	48	52	42	61	57
Age X_3	8	10	6	11	8	7	10	9	10	6	12	9

Q-03.

(a) A research team conducted a survey in which the subjects were adult smokers. Each subject in a random sample of 200 was asked to indicate the extent to which he or she agreed with the statement: "Would you like to quit smoking" the results was as follows:

Response:	Strongly agree	Agree	Disagree	strongly disagree
Number Responding:	102	30	60	8

Can one conclude on the basis of these data, in the sampled population, opinions are not equally distributed over the four levels of agreement by 5% LOS? 06

(b) Narcolepsy is a disease involving disturbances of the sleep wake cycle. Members of the German migraine headache Society studied the relationship between migraine headaches in 96 subjects diagnosed with narcolepsy and 96 healthy controls. The results are shown in the following table we wish to know if we may conclude, on the basis of these data, that the narcolepsy population and healthy populations represented by the samples are not homogeneous w.r.t. Migraine frequency by 5% LOS? 06

Major	Reported Migraine Headaches Yes	No	Total
Narcoleptic S	21	75	96
Healthy C	19	77	96
Total	40	152	192

(c) The general appearance score of 10 mentally retarded girls are given as follows:

Girl	Score	Girl	Score
1	4	6	6
2	5	7	10
3	8	8	7
4	8	9	6
5	9	10	6

We wish to know if we may conclude that the median score of the population from which we assume this sample to have been drawn is different from 5 by LOS 5%? 08

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Q-04.

(a) To assess the significance of possible variations in performance in a certain test between the grammar schools of a city, a common test was given to a number of students taken at random from the senior fifth class of each of the four schools concerned, Do a one way ANOVA for the results given below:

	SCHOOLS				
	A	B	C	D	
	8	12	18	13	
	10	11	12	9	
	12	9	16	12	
	8	14	6	16	
	7	4	8	15	
Total	45	50	60	65	Grand Total 220

Given that the tabulated value of the statistics at 0.05 LOS is equal to $F(3,16) = 3.24$. 06

(b) The following serum albumin values were obtained from 17 normal and 13 hospitalized subjects

Normal subjects:	2.4	3.5	3.1	4.0	4.2	3.0	3.2	3.5
	3.8	3.9	3.4	4.5	5.0	2.9	4.0	3.5
	3.6							
Hospitalized subjects:	1.5	2.0	3.4	1.7	2.0	3.1	1.3	1.5
	1.8	2.0	3.8	3.5	1.5			

Would you like to conclude at the 0.05 level of significance that the medians of the two populations are different use Yates Correction? 06

(c) The regimen status at 120 weeks for PI Naïve Experienced Subjects of taking indinavir /ritonavir is given in the following table: 08

	Remained in the Regimen for 120 weeks		
	Yes	No	Total
I (PI Naïve)	2	7	9
II(PA-Experienced)	8	4	12
Total	10	11	21

We wish to know if we may conclude that patients classified as G-I have a lower probability of remaining on the regimen for 120 weeks than of G-II?

Given b = 1For A = 12, B = 9, a = 8; LOS 5%.

Q-05.

(a) The weights of 9 obsessive women's before and after a 12 week VLCD treatment are shown as follows: 06

Before Treatment:	117.3	111.4	98.6	104.3	105.4	100.4	81.7	89.5	78.2
After Treatment:	83.3	85.9	75.8	82.9	82.3	77.7	62.7	69.0	63.9

Do these data indicate that the weight loss treatment VLCD is effective by 5% LOS?

(b) In a study of obesity the following results were obtained from samples of males and females between the ages of 20 & 75: 06

Sex size of sample	number of observations overweight
Males	150 21
Females	200 48

Can we conclude from these data that in the sampled populations there

(c) There are three main brands of a certain powder. A set of its 120 sales is examined and found to be allocated among four groups A, B, C, D and brands I,II, III as shown have under:

	GROUPS			
Brand	A	B	C	D
I	0	4	8	15
II	5	8	13	6
III	18	19	11	13

Is there any significant difference in brands preference? Answer at 5% LOS using one way ANOVA Table. (Take 10 as the code value to subtract from all given values in your working) Given $F(3,8)_{0.05} = 8.85$ 08

Q-06.

(a) Fit a curve of the type $y = ax^2 + \frac{b}{x}$ to the following data:

x:	1	2	3	4
y:	-1.51	0.99	3.88	7.66

06

(b) Suppose that the ages at time of onset of a certain disease are approximately normally distributed with a mean of 11.5 years and a SD of 3 years. A child has just come down with the disease. Find the probability that the child is:

a. Between the ages of 8.5 to 14.5 years

b. Over 10 years of age

c. Under 12

06

(c) Suppose that a population consists of the following values: 1, 3, 5, 7, 9. Construct the sampling distribution of means based on the sample size of two selected with replacement and without replacement respectively find the mean and variance of the same. 08

Q-07.

(a)The following are intraocular pressure (mm Hg) values recorded for a sample of 21 elderly subjects: 14.5, 12.9, 14.0, 16.1, 12.0, 17.5, 12.9, 17.9, 12.0, 16.4, 24.2, 12.2, 14.4, 17.0, 10.0, 18.5, 20.8, 16.2, 14.9, 19.6, 14.4. Can we conclude by 1% LOS that population mean is greater than 14? 06

(b) A physical therapist wished to compare three methods of teaching patients to use a certain prosthetic device. He felt that the rate of learning would be different for patients of different ages and wished to design an experiment in which the influence of age could be taken into account

TIME IN DAYS REQUIRED TO LEARN THE USE OF PROSTETIC DEVICE

	TEACHING METHOD			
AGE GROUP	A	B	C	TOTAL
Under 20	7	9	10	26
20 to 29	8	9	10	27
30 to 39	9	9	12	30
40 to 49	10	9	12	31
50 and Over	11	12	14	37
TOTAL	45	48	58	151

Using Two Way ANOVA Determine whether all treatment effects are equal or not? 06

(c) Define the following terms in detail show pictures wherever required:

1. Type I and Type II errors
2. Level of Significance & Critical Region