LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

M.Sc. DEGREE EXAMINATION - STATISTICS

THIRD SEMESTER – APRIL 2013

ST 3814 - STATISTICAL COMPUTING - II

Date : 07/05/2013   Dept. No.   Max. : 100 Marks
Time : 1:00 - 4:00

Answer any THREE questions
All carry equal marks

1. Let $X \sim B(1, \theta)$; $\theta = .1, .2, .3$ and $H :: \theta = .2 \; vs \; K : \theta = .1, .3$. Examine whether UMP level .05 test exist. Otherwise find UMPU. (33)

2. Mr. Senthil who studied I group in plus two has scored 75% in Mathematics. There were five sections in I group of Plus two in that particular school. The number of students who have scored more than 75% in mathematics in each of the five sections of I group of Plus two in that school are displayed below.

Section	No. Of Students
1	30
2	15
3	20
4	25
5	10

Using the following probability sampling design,

$$P(s) = \begin{cases} 0.20 \; for \; s = \{2,4,5\} \\ 0.15 \; for \; s = \{3,4,2\} \\ 0.25 \; for \; s = \{1,4,5\} \\ 0.10 \; for \; s = \{2,5\} \\ 0.25 \; for \; s = \{1,3,5\} \\ 0.05 \; for \; s = \{1,2,3\} \end{cases}$$

estimate the number of students who have scored more than Mr. Senthil assuming the set {1,3,5} is the sampled set. Find the true variance of the estimate and also find the estimated variance of the estimate. (33)

3. Suppose that the probability of a hot day (state 0) following a cool day(state 1)is 1/3 and that of a cool day following hot day is ½.Find

(33)

(i). The probability that may 3rd is a hot day given that may 1st is a hot day.

(ii) The probability that may 3rd is a hot day given that may 1st is a cool day.

(iii) The probability that may 5th is a hot day given that may 1st is a cool day.

(iv) The probability that 5th may is a hot day given that may 1st is a hot day.

4. Perspiration from 20 healthy females were analyzed. Three components X_1 = Sweat rate ,
   X_2 = Sodium content and X_3 = Potassium content were measured and the results are given
   Below:

Individual	X1	X2	X3
1	4	48.8	9.6
2	6	65.4	8.3
3	4.1	47.5	11.2
4	3.5	53.5	12.3
5	3.4	55.8	10
6	4.9	37.3	8.2
7	2.7	25.1	14.3
8	7.5	33.4	7.9
9	7	47.7	8.8
10	5.7	54.4	11.6
11	4.2	37.2	13
12	4.8	59.1	12.6
13	3.8	28.1	10.1
14	4.8	40.5	8.7
15	1.8	13.8	10.4
16	8.8	56.7	7.4
17	4.8	71.9	8.5
18	6.8	53.1	11.2
19	4.4	44.4	11.5
20	5.8	41.2	9.7

Test the hypothesis $H_0 : \mu' = [\, 7 \, , \, 51 \, , 11 \,]$ against $H_1 : \mu' \neq [\, 7 \, , \, 51 \, , 11 \,]$ at 1% level of significance.

5. a).A sample of 40 students is to drawn from a population of two hundred students belonging to A&B regions. The mean & standard deviation of their heights(in Inches) are given below.

Region	Total no. of people	Mean	S.D
A	150	43.3	2.4
B	50	52.1	3.2

   i) Derive a sample for each region using proportional allocation.
   ii) By using Neyman Allocation, Obtain the variance of the estimate of the population mean.

   (16 M)

b. From the following informations, Compare the precision of Systematic sampling, Simple random sampling and Stratified sampling.

Systematic Sampling Number

Strata	1	2	3	4	5	6	7	8
I	33	34	35	33	32	40	28	40
II	17	20	21	17	16	24	15	26
III	3	6	7	4	3	8	2	10
IV	8	11	12	9	7	16	5	15

   (17   M)