 LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

M.Sc. DEGREE EXAMINATION - STATISTICS

THIRD SEMESTER – NOVEMBER 2012

# ST 3814 - STATISTICAL COMPUTING - II

Date : 06/11/2012 Dept. No. Max. : 100 Marks

Time : 9:00 - 12:00

**Answer any THREE questions:**

**All carry equal marks**

1. From the following transition probability matrix,

0 1 2 3 4 5

1. State the state space
2. Find the equivalence class
3. Find the states which are recurrent or transient
4. Determine the periodicity of the states
5. Find the stationary distribution
6. Mr. Suresh has scored 97% in an entrance exam. It is decided to estimate the number of candidates who have scored more than Mr.Suresh. The marks scored by the candidates are displayed in 5 boards. The following is the relevant data,

|  |  |
| --- | --- |
| **Board No** | **No.Of Candidates** |
| 1 | 30 |
| 2 | 15 |
| 3 | 20 |
| 4 | 25 |
| 5 | 10 |

Guided by the contents of the boards it is decided to use the sampling design,

Estimate the number of candidates who have scored more than Mr. Suresh and also compute the estimated variance of the estimate assuming the set {1,3,5} is the sampled set. Find the true variance of the estimator.

1. a). The data below are obtained from a small artificial population which exhibits a fairly study raising trend. Each column represents a Systematic sample and the rows are the strata. Compare the precision of Systematic sampling, Simple random sampling and Stratified sampling.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Systematic Sampling Number** | | | | | | | | | |
| **Strata** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** |
| **I** | 28 | 32 | 33 | 33 | 35 | 34 | 37 | 39 | 40 | 40 |
| **II** | 15 | 16 | 17 | 17 | 21 | 20 | 22 | 25 | 26 | 24 |
| **III** | 2 | 3 | 3 | 4 | 7 | 6 | 9 | 9 | 10 | 8 |
| **IV** | 5 | 7 | 8 | 9 | 12 | 11 | 14 | 15 | 15 | 16 |

(17 M)

b). A sample of 40 students is to drawn from a population of two hundred students belonging

to A&B localities. The mean & standard deviation and their heights are given below

|  |  |  |  |
| --- | --- | --- | --- |
| **Locality** | **Total No.Of People** | **Mean (Inches)** | **S.D(Inches)** |
| A | 150 | 53.5 | 5.4 |
| B | 50 | 62.5 | 6.2 |

1. Draw a sample for each locality using proportional allocation
2. Obtain the variance of the estimate of the population mean under proportional allocation.

(16 M)

1. a) If X1 and X2 be 2 observations from  **f ( x, θ )= θ Xa-1 ,0 < X < 1.** To test H0 : **θ = 1 Vs H1 : θ = 2,** the critical region in C = {(X1, X2 **)|3/4x1 < x2 } .** Find the significance level and power of the test. Draw the power curve. (18 M)

b) Let **X ~ B ( 1, θ ); θ = 0.1, 0.2, 0.3.** Examine if UMP level 0.05 test exist for **H : θ = 0.1** Vs **K : θ = 0.2, 0.3.** (15 M)

1. Perspiration from 20 healthy females were analyzed. Three components X1 = Sweat rate , X2 = Sodium content and X3 = Potassium content were measured and the results are given below:

**Individual X1 X2 X3**

1 3.8 48.6 9.4

2 5.8 65.2 8.1

3 3.9 47.3 11.0

4 3.3 53.3 12.1

5 3.2 55.6 9.8

6 4.7 37.1 8.0

7 2.5 24.9 14.1

8 7.3 33.2 7.7

9 6.8 47.5 8.6

10 5.5 54.2 11.4

11 4.0 37.0 12.8

12 4.6 58.9 12.4

13 3.6 27.9 9.9

14 4.6 40.3 8.5

15 1.6 13.6 10.2

16 8.6 56.5 7.2

17 4.6 71.7 8.3

18 6.6 52.9 11.0

19 4.2 44.2 11.3

20 5.6 41.0 9.5

Test the hypothesis H0 : µ´ = [ 6 , 52 , 12 ] against H1 : µ´ ≠ [ 6 , 52 , 12 ] at 1% level of

significance.

\*\*\*\*\*\*\*