

Register No:

Second Semester M.Sc. Degree Examination, August 2009
Statistics
Paper 2.5 – Practical I

Time: Three Hours

Maximum Marks: 40

Answer three questions without omitting any part

Part A: Inference I (Estimation)

1 (a) A random sample of size 10 is drawn from an exponential distribution with mean λ . The observations are

12.1, 21.6, 14.2, 17.1, 11.2, 23.3, 30.0, 14.4, 27.3, 15.8

Obtain the UMVUE of λ

(2)

(b) A random sample of size 9 from the Uniform $(0, \theta)$ population is given below.

5.2, 4.1, 3.4, 1.8, 7.5, 5.9, 8.2, 2.7, 3.8

Find (i) Maximum likelihood estimate of θ

(ii) Moment estimate of θ

(iii) 92% shortest confidence interval for θ .

(2+2+3)

(c) Obtain the moment estimates of α and β of the beta (α, β) population from the given sample observations 0.12, 0.23, 0.35, 0.20, 0.17, 0.14, 0.19.

(4)

2 (a) Find 95% shortest confidence interval for the parameter μ of $N(\mu, \sigma^2)$ based on the following random observations.

70, 120, 110, 101, 88, 83, 95, 98, 107, 100

(6)

(b) Obtain the minimum variance bound estimate of σ^2 based on the random sample 2, 4, 8, 5, 7, 9, 8, 9 from $N(0, \sigma^2)$.

$$\text{MVBE of } \sigma^2 = \frac{\sum x_i^2}{n}$$

(3)

(c) Compute 99% confidence limits for the parameter λ of Poisson (λ) based on a large sample of 900 observations with mean 16.

$$z = \frac{n \left(\frac{\bar{x}}{\lambda} - 1 \right)}{\sqrt{n/\lambda}}$$

(4)

Part B: Design of Experiments

3 (a) The following table gives wheat yields in acre of four varieties grown in five randomized blocks. Test whether the mean yield of these varieties differ significantly.

Blocks	Varieties			
	A	B	C	D
1	99	70	90	99
2	96	65	80	95
3	95	60	48	87
4	98	65	70	95
5	97	65	62	99

(b) Let n, p, k represent the three fertilizers nitrogen, phosphorus, and potash each at two levels. Examine the non-significance of factorial effects.

Block								
1	(nk)	(l)	(n)	(npk)	(pk)	(k)	(np)	(p)
	10.2	14.7	10.8	12	13	13.3	9.1	11.4
2	(k)	(np)	(nk)	(p)	(l)	(n)	(pk)	(npk)
	16.2	12.2	9.3	8.9	12.7	15.2	10.4	10.5
3	(p)	(pk)	(nk)	(k)	(np)	(n)	(npk)	(l)
	14.6	13.8	8.8	8.3	11.3	12.1	11.7	8.2
4	(n)	(l)	(pk)	(npk)	(np)	(nk)	(p)	(k)
	12.7	13.9	9	10.3	10.3	11.5	9.3	13.5

4(a) The table below gives the yield of wheat (kg/plots) as observed in an experiment carried out in a 5×5 LSD. The treatments are indicated by A, B, C, D and E.

B	C	A	B D	E
51.8	48.6	33.4	53.5	41.8
D	E	C	B	A
50.5	45.5	51.8	52.0	51.9
A	D	B	E	C
46.1	47.9	55.6	52.1	53.3
C	B	E	A	D
58.7	55.1	43.2	38.8	53.0
E	A	D	C	B
53.0	41.0	48.7	54.6	55.7

(b) The process A, B and C are listed to see whether their outputs are equivalent to the following outputs are obtained.

A: 10 12 13 11 10 14 15 13

B: 9 11 10 12 13

C: 11 10 15 14 12 13

Carry out the analysis and state your conclusions.

Part C: Sampling Techniques

- 5 Given the number of standards of pepper in 15 clusters of four fields each selected by SRSWOR out of 25 clusters. Estimate the average number of standards per field along with its standard error.

Cluster	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	22	53	43	50	73	65	71	24	21	36	72	68	59	43	76
2	18	47	29	47	62	71	75	49	72	43	49	64	72	35	58
3	27	38	37	41	58	69	31	43	47	51	56	76	67	71	47
4	28	29	47	51	47	59	21	75	72	39	69	57	76	40	34

- 6 The number of labors X (in thousands) and the quantity of raw materials (in lakhs) are given below for 20 mills. Draw a sample of 5 units by SRSWOR. Compute the ratio estimate along with their variance. Also compare the variances of estimate of mean per unit.

No	X	Y	No	X	Y
1	368	31	11	512	31
2	384	33	12	503	29
3	361	37	13	472	38
4	347	39	14	429	41
5	403	43	15	367	40
6	529	61	16	376	38
7	703	68	17	412	42
8	396	42	18	345	45
9	473	41	19	297	32
10	509	49	20	633	50