

Second Semester M.Sc. Degree Examination, August 2014

STATISTICS

Paper 2.5 – Practical 1

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 (i) UMVUE of λ (ii) MLE of λ (3)

- (b) Obtain the moment estimates of α and β of the beta distribution of first kind population with parameters (α, β) from the given sample observations

0.12, 0.23, 0.35, 0.20, 0.17, 0.14, 0.19. (4)

- (c) 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 (3)

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

(2)

- (e) Compute 99% confidence limits for the parameter λ of Poisson (λ) based on a large sample of 900 observations with mean 16. (2)

OR

2. a) A random sample of size 12 is drawn from a uniform $(0, \theta)$ population. The observations are 35, 24, 40, 18, 32, 22, 16, 41, 38, 29, 30, 20

Obtain (i) Maximum Likelihood Estimate of θ

(ii) UMVUE of θ

(iii) 90% shortest confidence interval for θ

(iv) Moment estimator of θ (5)

- b) Following are random sample drawn from gamma distribution $G(\alpha, \beta)$ population. Estimate α and β by the method of moments.

12.8, 15.6, 19.2, 20.4, 17.1, 14.6, 12.9, 11.5, 13.6, 16.3 (4)

- c) Find 95% unbiased confidence interval for the parameter μ of the $N(\mu, 1)$ distribution based on the following random observations.

10.5, 11.2, 13.6, 24.1, 8.6, 7.4, 15.3, 20.8, 12.5, 19.4 (2)

- d) Following are random samples drawn from two normal populations with common variance. Estimate the difference between population means by a 95% confidence interval.

Population I : 50, 45, 68, 72, 76, 65, 48, 81, 73, 44, 52, 60.

Population II : 42, 50, 61, 63, 72, 54, 41, 75, 70, 44, 50, 55. (3)

PART B: DESIGN OF EXPERIMENTS

3. (a) In a green house experiment on wheat, four fertilizers and four chemicals were used. Each combination was applied in three plots at random. The following table gives the yield obtained based on the experiment. Analyze the data and state your conclusions.

Fertilizer	Chemicals			
	1	2	3	4
1	21, 21.4, 21.2	20.6, 20.3, 20.9	18.8, 19.2, 19.6	16.6, 17, 17.6
2	12, 13.1, 14.2	13.1, 13.3, 13.6	13, 13.2, 13.6	13.3, 13.6, 14
3	11.9, 12.5, 13	14, 15.1, 15.6	12.3, 12.7, 12.9	12.4, 12.9, 13.7
4	12.8, 13, 13.8	13.2, 13.7, 14.1	13.6, 13.9, 14.2	12, 13.2, 14.6

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

(c). 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.

OR

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

(c). The data below gives the yield in grams corresponding to five different varieties of barley. Test whether the varieties of barley are significant or not with respect to their yields.

Varieties of barley	Yields					
	1	320	420	353	331	358
2	372	455	375	328	308	
3	350	417	400	325	378	275
4	340	360	358	370	395	375
5	398	358	334	340	430	

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

OR

- 6 The total number of trees in 17 randomly selected villages from 117 villages are given below. Estimate the total number of trees in the survey by ratio method. Find its estimate of variance. Give the total number of trees in the census (X) is 143968. (X= measurement in the census and Y= measurement in the survey).

No	X	Y	No	X	Y
1	1141	1129	11	1170	1153
2	1144	1144	12	1115	1125
3	1127	1125	13	1130	1116
4	1153	1138	14	1118	1115
5	1117	1137	15	1122	1112
6	1140	1127	16	1113	1112
7	1153	1163	17	1166	1123
8	1146	1153			
9	1189	1164			
10	1137	1130			