Question Paper

Exam Date & Time: 02-May-2023 (10:00 AM - 01:00 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

IV Year Pharm D/ I Pharm D Post Baccalaureate
University Examination April 2023

Biostatistics and Research Methodology [PPR 4.4T-S2]

Marks: 70 **Duration: 180 mins.**

A: Long Answer Questions

Answer all the questions.

Draw diagrams wherever necessary

1) Explain the various measures of central tendency with their formula. (6)

a)

b) In a study carried out to find out the prevalence of anemia among high-school girls in a village, 60 girls out of total 450 participants found to be anemic, calculate both 90% and 95% confidence interval for the prevalence and compare. (4)

2) Write the general steps involved in the calculation of Kruskal-Wallis test. (5)

a)

b) Body temperature of six patients were measured using mercury (Hg) thermometer and again by IR thermometer. Temperature readings are given below. Using suitable parametric test find out is there, significant difference in the body temperature measured by Hg thermometer & IR thermometers. (5)

Patient ID	Body temperature (in ºF)	
	Hg thermometer	IR thermometer
1	98.8	100.2
2	96.8	99.9
3	94.6	94.4
4	98.6	98.2
5	97.2	98.5
6	96.4	96.6

Table of Distribution of t

	Probability Type-I error (alpha)					
DF	*0.5*	*0.1*	*0.05*	*0.02*	*0.01*	*0.001*
1	1.000	6.314	12.706	31.821	63.657	636.619
2	0.816	2.920	4.303	6.965	9.925	31.598
3	0.765	2.353	3.182	4.541	5.841	12.941
4	0.741	2.132	2.776	3.747	4.604	8.610
5	0.727	2.015	2.571	3.365	4.032	6.859

6	0.718	1.943	2.447	3.143	3.707	5.959
7	0.711	1.895	2.365	2.998	3.499	5.405
8	0.706	1.860	2.306	2.896	3.355	5.041
9	0.703	1.833	2.262	2.821	3.250	4.781
10	0.700	1.812	2.228	2.764	3.169	4.587
11	0.697	1.796	2.201	2.718	3.106	4.437
12	0.695	1.782	2.179	2.681	3.055	4.318
13	0.694	1.771	2.160	2.650	3.012	4.221
14	0.692	1.761	2.145	2.624	2.977	4.140
15	0.691	1.753	2.131	2.602	2.947	4.073
16	0.690	1.746	2.120	2.583	2.921	4.015
17	0.689	1.740	2.110	2.567	2.898	3.965
18	0.688	1.734	2.101	2.552	2.878	3.922
19	0.688	1.729	2.093	2.539	2.861	3.883
20	0.687	1.725	2.086	2.528	2.845	3.850
21	0.686	1.721	2.080	2.518	2.831	3.819
22	0.686	1.717	2.074	2.508	2.819	3.792
23	0.685	1.714	2.069	2.500	2.807	3.767
24	0.685	1.711	2.064	2.492	2.797	3.745
25	0.684	1.708	2.060	2.485	2.787	3.725
26	0.684	1.706	2.056	2.479	2.779	3.707
27	0.684	1.703	2.052	2.473	2.771	3.690
28	0.683	1.701	2.048	2.467	2.763	3.674
29	0.683	1.699	2.045	2.462	2.756	3.659
30	0.683	1.697	2.042	2.457	2.750	3.646
40	0.681	1.684	2.021	2.423	2.704	3.551
60	0.679	1.671	2.000	2.390	2.660	3.460
120	0.677	1.658	1.980	2.358	2.617	3.373
α	0.674	1.645	1.960	2.326	2.576	3.291

3) Explain cohort study design in detail. (10)

B: Short Answer Questions

Answer all the questions.

4) Explain the construction and application of pie chart and box plot. (5)

5) In a clinical trial to test the efficacy of a new analgesic, two groups of patients were randomly assigned to receive placebo or new drug and their pain score was evaluated. Data is given in the table. Using a suitable non-parametric test,check whether the new drug is effective in reducing pain? (5)

Patient ID	Pain score	
	Placebo	New drug
1	8	6
2	9	5
3	7	4
4	8	6
5	9	4
6	10	8

Table E Mann–Whitney test on unpaired samples: 5% and 1% levels of P

5% critical points of rank sums

$n_1 \rightarrow$ / $n_2 \downarrow$	2	3	4	5	6	7	8	9	10	11	12	13	14	15
4			10											
5		6	11	17										
6		7	12	18	26									
7		7	13	20	27	36								
8	3	8	14	21	29	38	49							
9	3	8	15	22	31	40	51	63						
10	3	9	15	23	32	42	53	65	78					
11	4	9	16	24	34	44	55	68	81	96				
12	4	10	17	26	35	46	58	71	85	99	115			

13	4	10	18	27	37	48	60	73	88	103	119	137		
14	4	11	19	28	38	50	63	76	91	106	123	141	160	
15	4	11	20	29	40	52	65	79	94	110	127	145	164	185
16	4	12	21	31	42	54	67	82	97	114	131	150	169	
17	5	12	21	32	43	56	70	84	100	117	135	154		
18	5	13	22	33	45	58	72	87	103	121	139			
19	5	13	23	34	46	60	74	90	107	124				
20	5	14	24	35	48	62	77	93	110					
21	6	14	25	37	50	64	79	95						
22	6	15	26	38	51	66	82							
23	6	15	27	39	53	68								
24	6	16	28	40	55									
25	6	16	28	42										
26	7	17	29											
27	7	17												
28	7													

6) A case control study was conducted to identify the association between hay fever and eczema. Data is given in the below table. Using an appropriate statistical test find is there any association between hay fever and eczema? (5)

Hay fever	Eczema	
	Yes	No
Yes	125	375
No	780	12220

Distribution of χ^2

	Probability				
d.f.	0·50	0·10	0·05	0·02	0·01
1	0·455	2·706	3·841	5·412	6·635
2	1·386	4·605	5·991	7·824	9·210
3	2·366	6·251	7·815	9·837	11·345
4	3·357	7·779	9·488	11·668	13·277
5	4·351	9·236	11·070	13·388	15·086
6	5·348	10·645	12·592	15·033	16·812
7	6·346	12·017	14·067	16·622	18·475
8	7·344	13·362	15·507	18·168	20·090
9	8·343	14·684	16·919	19·679	21·666
10	9·342	15·987	18·307	21·161	23·209
11	10·341	17·275	19·675	22·618	24·725
12	11·340	18·549	21·026	24·054	26·217
13	12·340	19·812	22·362	25·472	27·688
14	13·339	21·064	23·685	26·873	29·141
15	14·339	22·307	24·996	28·259	30·578

7) Define incidence, prevalence and explain their application in epidemiology. (5)

8) Explain the different measures of association used in epidemiological study (5)

8)	Explain the different measures of association used in epidemiological study.	(5)
9)	Write the application of computers in community pharmacy.	(5)

C. Give Reasons for the Following

Answer all the questions.

10)	Changing from 95% CI to 90% CI decreases the width of confidence interval.	(2)
11)	Interquartile range is the best measure for skewed distributions or data sets with outliers	(2)
12)	Graphical presentation plays important role in presentation of data.	(2)
13)	Case reports are considered as descriptive study.	(2)
14)	Computer plays important role in hospital pharmacy fuctioning.	(2)

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