IIHMR UNIVERSITY

Institute of Health Management Research

EXAMINATION CELL IIHMR UNIVERSITY

MBA Hospital and Health Management

Batch-24 (2019-2021)

Bio-Statistics

Term Examination

1 Year

December 2019

Time - 3 Hour **MM-50**

The question paper contains 3 printed pages.

Note:

a. Kindly attach the question paper with the answer sheet at the time of submission of answer sheet.
b. All sections are compulsory.
c. Marks are indicated against each question.

Section A

Q. 1. Kindly tick (√) against the correct option. (4 x 2marks = 8 marks)

i. Severity of pain (mild, moderate and severe) is what type of variable:

a. Interval
b. Nominal
c. Ordinal
d. Ratio

ii. A hospital discharged 8 patients from the OB unit on August 15th . The length of stay for each of the patients was as follows: for patient A; 2 days; for patient B; 6 days; for patient C; 2 days ; for patient D; 2 days ; for patient E; 6 days; for patient F; 10 days; for patient G; 3 days; for patient H; 4 days. What was the MEDIAN length of stay?

a. 4.37 days
b. 2.00 days
c. 3.50 days
d. 3.00 days

iii. In a data set the largest value is 60 and the smallest value is 40 and width of the class interval is 5 then the number of class interval desired is

a. 20
b. 4
c. 5
d. 15

iv. The accuracy of estimating the parameter increases with

a. Decreasing sample size
b. Increasing variability
c. Increasing sample size and decreasing variability
d. Decreasing precision
e. Decreasing precision

Kindly fill in the blanks for the following (3 x 2marks = 6 marks)

v. When a population follows a normal distribution, we can describe the distribution with two parameters…….. and ……..

vi. The fixed cut-off on the basis of sample size for applying at 't' test -test is that the sample size is less than……..

vii. The value of Pearson's coefficient of correlation lies between ……..

Kindly write True or False against the statement (3 × 2 marks = 6 marks)

A study was conducted to investigate the relationship between men height (inch) and its weight (pound). A random sample of 200 men height and weight was measured. Answer true or false for the following statements:

viii. Analysis of the data from this study could be performed using a two-sample t-test.

ix. A scatter diagram should be used to present the data.

x. Simple linear regression could be used to predict the weight of the men based on their height.

Section B

Define any four from the following (4 x 2.5 marks= 10 marks)

a. Use of Biostatistics in health field
b. Levels of measurement (Types of scale)
c. Two types of errors in hypothesis testing
d. Normal distribution
e. Steps followed in testing of hypothesis
f. Chi-squared test

Section C

Attempt any two from the following questions

1. An investigator wants to determine the estimated value of average haemoglobin level for women in the age group of 15 – 49 years. Suppose that the sample mean and standard deviation of the haemoglobin levels is known to be 12.46 and 2.8, respectively, as obtained from a sample of 10,000 women. Obtain 95% and 99% confidence intervals for the mean haemoglobin level for the specified population. (10 marks)

2. Suppose the mean haemoglobin level of women between the ages 18 and 25 years in a particular community is 8.3 g/dL in 1996. A random sample of 20 women in the similar age are chosen from the same locality in 2016 to test whether there is a difference in the haemoglobin levels over the last 20 years in that community. The data of haemoglobin levels of 20 women are given below:

10.18	11.29	7.78	9.60	10.00	11.87	10.02	11.07	10.71	8.30	12.43	10.46
7.24	10.42	8.69	12.00	9.08	8.67	8.80	9.92				

Use level of significance $\alpha = 0.05$. (10 marks)

3. In a random sample of 500 mothers who had singleton births from 2011 to 2015in a large tertiary hospital, one of our aims is to examine whether maternal hypertension is a risk factor for preterm delivery. The summary of the data is presented as follows:

Maternal Hypertention	Gestational Age		Total
	Preterm	Term	
Yes	7	20	27
No	41	432	473
Total	48	452	500

Test whether there is an increased risk of preterm birth among pregnant mothers with hypertension? Use level of significance $\alpha = 0.05$. (10 marks)

4. The table below shows the height, x, in inches and the pulse rate, y, per minute, for 9 people:

x	68	72	65	70	62	75	78	64	68
y	90	85	88	100	105	98	70	65	72

a. Find the regression equation of pulse rate on height. (7 marks)
b. Predict the pulse rate for a 100 inches height (3 marks)

TABLE T/2

Critical Values of Students' *t*

df	$p = .1$	.05	.02	.01	.005	.002	.001
1	6.314	12.706	31.821	63.657	127.320	318.31	636.62
2	2.920	4.303	6.965	9.925	14.089	22.327	31.598
3	2.353	3.182	4.541	5.841	7.453	10.214	12.924
4	2.132	2.776	3.747	4.604	5.598	7.173	8.610
5	2.015	2.571	3.365	4.032	4.773	5.893	6.869
6	1.943	2.447	3.143	3.707	4.317	5.208	5.959
7	1.895	2.365	2.998	3.499	4.029	4.785	5.408
8	1.860	2.306	2.896	3.355	3.833	4.501	5.041
9	1.833	2.262	2.821	3.250	3.690	4.297	4.781
10	1.812	2.228	2.764	3.169	3.581	4.144	4.587
11	1.796	2.201	2.718	3.106	3.497	4.025	4.437
12	1.782	2.179	2.681	3.055	3.428	3.930	4.318
13	1.771	2.160	2.650	3.012	3.372	3.852	4.221
14	1.761	2.145	2.624	2.977	3.326	3.787	4.140
15	1.753	2.131	2.602	2.947	3.286	3.733	4.073
16	1.746	2.120	2.583	2.921	3.252	3.686	4.015
17	1.740	2.110	2.567	2.898	3.222	3.646	3.965
18	1.734	2.101	2.552	2.878	3.197	3.610	3.922
19	1.729	2.093	2.539	2.861	3.174	3.579	3.883
20	1.725	2.086	2.528	2.845	3.153	3.552	3.850
21	1.721	2.080	2.518	2.831	3.135	3.527	3.819
22	1.717	2.074	2.508	2.819	3.119	3.505	3.792
23	1.714	2.069	2.500	2.807	3.104	3.485	3.767
24	1.711	2.064	2.492	2.797	3.091	3.467	3.745
25	1.708	2.060	2.485	2.787	3.078	3.450	3.725
26	1.706	2.056	2.479	2.779	3.067	3.435	3.707
27	1.703	2.052	2.473	2.771	3.057	3.421	3.690
28	1.701	2.048	2.467	2.763	3.047	3.408	3.674
29	1.699	2.045	2.462	2.756	3.038	3.396	3.659
30	1.697	2.042	2.457	2.750	3.030	3.385	3.646
40	1.684	2.021	2.423	2.704	2.971	3.307	3.551
60	1.671	2.000	2.390	2.660	2.915	3.232	3.460
120	1.658	1.980	2.358	2.617	2.860	3.160	3.373
∞	1.645	1.960	2.326	2.576	2.807	3.090	3.291

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Standard Normal Probabilities

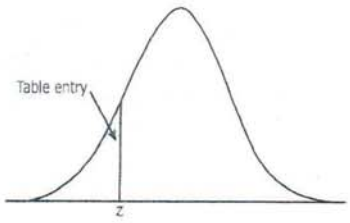

Table entry for z is the area under the standard normal curve to the left of z.

z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
−3.4	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0002
−3.3	.0005	.0005	.0005	.0004	.0004	.0004	.0004	.0004	.0004	.0003
−3.2	.0007	.0007	.0006	.0006	.0006	.0006	.0006	.0005	.0005	.0005
−3.1	.0010	.0009	.0009	.0009	.0008	.0008	.0008	.0008	.0007	.0007
−3.0	.0013	.0013	.0013	.0012	.0012	.0011	.0011	.0011	.0010	.0010
−2.9	.0019	.0018	.0018	.0017	.0016	.0016	.0015	.0015	.0014	.0014
−2.8	.0026	.0025	.0024	.0023	.0023	.0022	.0021	.0021	.0020	.0019
−2.7	.0035	.0034	.0033	.0032	.0031	.0030	.0029	.0028	.0027	.0026
−2.6	.0047	.0045	.0044	.0043	.0041	.0040	.0039	.0038	.0037	.0036
−2.5	.0062	.0060	.0059	.0057	.0055	.0054	.0052	.0051	.0049	.0048
−2.4	.0082	.0080	.0078	.0075	.0073	.0071	.0069	.0068	.0066	.0064
−2.3	.0107	.0104	.0102	.0099	.0096	.0094	.0091	.0089	.0087	.0084
−2.2	.0139	.0136	.0132	.0129	.0125	.0122	.0119	.0116	.0113	.0110
−2.1	.0179	.0174	.0170	.0166	.0162	.0158	.0154	.0150	.0146	.0143
−2.0	.0228	.0222	.0217	.0212	.0207	.0202	.0197	.0192	.0188	.0183
−1.9	.0287	.0281	.0274	.0268	.0262	.0256	.0250	.0244	.0239	.0233
−1.8	.0359	.0351	.0344	.0336	.0329	.0322	.0314	.0307	.0301	.0294
−1.7	.0446	.0436	.0427	.0418	.0409	.0401	.0392	.0384	.0375	.0367
−1.6	.0548	.0537	.0526	.0516	.0505	.0495	.0485	.0475	.0465	.0455
−1.5	.0668	.0655	.0643	.0630	.0618	.0606	.0594	.0582	.0571	.0559
−1.4	.0808	.0793	.0778	.0764	.0749	.0735	.0721	.0708	.0694	.0681
−1.3	.0968	.0951	.0934	.0918	.0901	.0885	.0869	.0853	.0838	.0823
−1.2	.1151	.1131	.1112	.1093	.1075	.1056	.1038	.1020	.1003	.0985
−1.1	.1357	.1335	.1314	.1292	.1271	.1251	.1230	.1210	.1190	.1170
−1.0	.1587	.1562	.1539	.1515	.1492	.1469	.1446	.1423	.1401	.1379
−0.9	.1841	.1814	.1788	.1762	.1736	.1711	.1685	.1660	.1635	.1611
−0.8	.2119	.2090	.2061	.2033	.2005	.1977	.1949	.1922	.1894	.1867
−0.7	.2420	.2389	.2358	.2327	.2296	.2266	.2236	.2206	.2177	.2148
−0.6	.2743	.2709	.2676	.2643	.2611	.2578	.2546	.2514	.2483	.2451
−0.5	.3085	.3050	.3015	.2981	.2946	.2912	.2877	.2843	.2810	.2776
−0.4	.3446	.3409	.3372	.3336	.3300	.3264	.3228	.3192	.3156	.3121
−0.3	.3821	.3783	.3745	.3707	.3669	.3632	.3594	.3557	.3520	.3483
−0.2	.4207	.4168	.4129	.4090	.4052	.4013	.3974	.3936	.3897	.3859
−0.1	.4602	.4562	.4522	.4483	.4443	.4404	.4364	.4325	.4286	.4247
−0.0	.5000	.4960	.4920	.4880	.4840	.4801	.4761	.4721	.4681	.4641

Standard Normal Probabilities

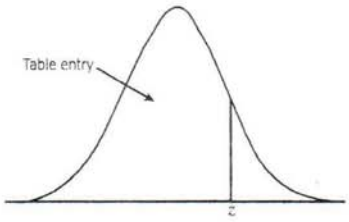

Table entry for z is the area under the standard normal curve to the left of z.

z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.5000	.5040	.5080	.5120	.5160	.5199	.5239	.5279	.5319	.5359
0.1	.5398	.5438	.5478	.5517	.5557	.5596	.5636	.5675	.5714	.5753
0.2	.5793	.5832	.5871	.5910	.5948	.5987	.6026	.6064	.6103	.6141
0.3	.6179	.6217	.6255	.6293	.6331	.6368	.6406	.6443	.6480	.6517
0.4	.6554	.6591	.6628	.6664	.6700	.6736	.6772	.6808	.6844	.6879
0.5	.6915	.6950	.6985	.7019	.7054	.7088	.7123	.7157	.7190	.7224
0.6	.7257	.7291	.7324	.7357	.7389	.7422	.7454	.7486	.7517	.7549
0.7	.7580	.7611	.7642	.7673	.7704	.7734	.7764	.7794	.7823	.7852
0.8	.7881	.7910	.7939	.7967	.7995	.8023	.8051	.8078	.8106	.8133
0.9	.8159	.8186	.8212	.8238	.8264	.8289	.8315	.8340	.8365	.8389
1.0	.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8599	.8621
1.1	.8643	.8665	.8686	.8708	.8729	.8749	.8770	.8790	.8810	.8830
1.2	.8849	.8869	.8888	.8907	.8925	.8944	.8962	.8980	.8997	.9015
1.3	.9032	.9049	.9066	.9082	.9099	.9115	.9131	.9147	.9162	.9177
1.4	.9192	.9207	.9222	.9236	.9251	.9265	.9279	.9292	.9306	.9319
1.5	.9332	.9345	.9357	.9370	.9382	.9394	.9406	.9418	.9429	.9441
1.6	.9452	.9463	.9474	.9484	.9495	.9505	.9515	.9525	.9535	.9545
1.7	.9554	.9564	.9573	.9582	.9591	.9599	.9608	.9616	.9625	.9633
1.8	.9641	.9649	.9656	.9664	.9671	.9678	.9686	.9693	.9699	.9706
1.9	.9713	.9719	.9726	.9732	.9738	.9744	.9750	.9756	.9761	.9767
2.0	.9772	.9778	.9783	.9788	.9793	.9798	.9803	.9808	.9812	.9817
2.1	.9821	.9826	.9830	.9834	.9838	.9842	.9846	.9850	.9854	.9857
2.2	.9861	.9864	.9868	.9871	.9875	.9878	.9881	.9884	.9887	.9890
2.3	.9893	.9896	.9898	.9901	.9904	.9906	.9909	.9911	.9913	.9916
2.4	.9918	.9920	.9922	.9925	.9927	.9929	.9931	.9932	.9934	.9936
2.5	.9938	.9940	.9941	.9943	.9945	.9946	.9948	.9949	.9951	.9952
2.6	.9953	.9955	.9956	.9957	.9959	.9960	.9961	.9962	.9963	.9964
2.7	.9965	.9966	.9967	.9968	.9969	.9970	.9971	.9972	.9973	.9974
2.8	.9974	.9975	.9976	.9977	.9977	.9978	.9979	.9979	.9980	.9981
2.9	.9981	.9982	.9982	.9983	.9984	.9984	.9985	.9985	.9986	.9986
3.0	.9987	.9987	.9987	.9988	.9988	.9989	.9989	.9989	.9990	.9990
3.1	.9990	.9991	.9991	.9991	.9992	.9992	.9992	.9992	.9993	.9993
3.2	.9993	.9993	.9994	.9994	.9994	.9994	.9994	.9995	.9995	.9995
3.3	.9995	.9995	.9995	.9996	.9996	.9996	.9996	.9996	.9996	.9997
3.4	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9998

TABLE T/5

Critical Values of χ^2

df	$p = .100$	.050	.025	.010	.005	.001
1	2.71	3.84	5.02	6.63	7.88	10.83
2	4.61	5.99	7.38	9.21	10.60	13.82
3	6.25	7.81	9.35	11.34	12.84	16.27
4	7.78	9.49	11.14	13.28	14.86	18.47
5	9.24	11.07	12.83	15.09	16.75	20.52
6	10.64	12.59	14.45	16.81	18.55	22.46
7	12.02	14.07	16.01	18.48	20.28	24.32
8	13.36	15.51	17.53	20.09	21.96	26.13
9	14.68	16.92	19.02	21.67	23.59	27.88
10	15.99	18.31	20.48	23.21	25.19	29.59
11	17.28	19.68	21.92	24.73	26.76	31.26
12	18.55	21.03	23.34	26.22	28.30	32.91
13	19.81	22.36	24.74	27.69	29.82	34.53
14	21.06	23.68	26.12	29.14	31.32	36.12
15	22.31	25.00	27.49	30.58	32.80	37.70
16	23.54	26.30	28.85	32.00	34.27	39.25
17	24.77	27.59	30.19	33.41	35.72	40.79
18	25.99	28.87	31.53	34.81	37.16	42.31
19	27.20	30.14	32.85	36.19	38.58	43.82
20	28.41	31.41	34.17	37.57	40.00	45.32
21	29.62	32.67	35.48	38.93	41.40	46.80
22	30.81	33.92	36.78	40.29	42.80	48.27
23	32.01	35.17	38.08	41.64	44.18	49.73
24	33.20	36.42	39.36	42.98	45.56	51.18
25	34.38	37.65	40.65	44.31	46.93	52.62
26	35.56	38.89	41.92	45.64	48.29	54.05
27	36.74	40.11	43.19	46.96	49.64	55.48
28	37.92	41.34	44.46	48.28	50.99	56.89
29	39.09	42.56	45.72	49.59	52.34	58.30
30	40.26	43.77	46.98	50.89	53.67	59.70
40	51.81	55.76	59.34	63.69	66.77	73.40
50	63.17	67.50	71.42	76.15	79.49	86.66
60	74.40	79.08	83.30	88.38	91.95	99.61
70	85.53	90.53	95.02	100.43	104.21	112.32
80	96.58	101.88	106.63	112.33	116.32	124.84
90	107.57	113.15	118.14	124.12	128.30	137.21
100	118.50	123.34	129.56	135.81	140.17	149.45

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