International Institute of Health Management Research (IIHMR)
NEW DELHI
Batch- 2019-21
Term Exams: January 2020

Time – 3 Hrs **Total marks: 70**

Bio-Statistics

Instruction:

All answers are to be written on the answer sheet only. Answers written on the question paper will not be marked. Please mention the roll number on your answer sheet.

Part I: (Attempt **All** questions) **(0.5* 18= 9 Marks)**

Q1.1 *Variance* is used to measure the dispersion of values relative to the ----------

(1) Median (2) Mean (3) Mode

Q 1.2 *Number of Birth, Number of Death are* ----------

(1) *Discrete Quantitative Data* (2) Continuous *Quantitative Data*

(3) None of the above

Q1.3 ---------- *is not as drastically affected by extreme values*

(1) Median (2) Mean (3) Mode

Q1.4 ----------*is formula to calculate sample standard deviation*

(a)	$s^2 = \frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n-1}$	(b)	$\sigma^2 = \frac{\sum_{i=1}^{N}(x_i - \mu)^2}{N}$
(c)	$s = \sqrt{\frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n-1}}$	(d)	$\sigma = \sqrt{\frac{\sum_{i=1}^{N}(x_i - \mu)^2}{N}}$

Q1.5 All the following are method of presentation of statistical data ***except***:

a) Bar chart
b) Pie diagram
c) Normal curve
d) Frequency polygon

Q1.6 Which of the following is true about regression analysis?

a) Regression analysis provides only correlation between two variables
b) Regression analysis is used to compare mean of two groups
c) Regression analysis provides estimates of values of dependent variable from values of independent variable
d) Regression analysis is used to compare standard deviation of two groups

Q 1.7 Rural Health Statistics can be download from……portal

(1) MHFW, GOI (2) NFHS

(3) Both (4) None of the above

Q1.8 Poisson distribution can be used to approximate the binomial distribution if ---------

(1) λ =p (2) λ =np

(3) $\lambda = p^x q^{n-x}$ (4) None of the above

Q1.9 ------ filename extensions is used for output file in SPSS

(1) .dat (2) .sps

(3) .sav (3) .spv

Q 1.10 If value of Correlation Coefficient is 0.58 then we can say that correlation between two variable is

(a) A modest correlation (b) A weak correlation

(c) A strong correlation (d) None of the above

Q 1.11 Life expectancy information, one can get from ---------web site

(a) Census (b) MOHFW (c)Census and MOHFW both (d) None of the above

Q 1.12 Correlation between variables can be estimated with using ……..formula in Excel

(a) Correl (array 1, array2) (b) Randbetween (bottom, top)

(b) Correlation (array 1, array2) (d) None of the above

Q1.13 Data Entry format of SPSS has ------ sheet

(a) 2 (b) 3 (c) 4 (d) 5 or more

Q1.14 One Card is drawn from a well shuffled deck of 52 cards. If each outcome is equally likely, calculate the probability that the card will **not a red card**

(a) 1/2 (b)13/52 (c)3/4 (d) 12/13

Q1.15 **In Chi-Square test,** we have to calculate expected frequency of each cell and in the below table, expected frequency of **three cell** is given as E2= 35.6, E3=41.6 & E4=33.4, what will be expected frequency of **fourth cell E1?**

Table: Utilization of antenatal clinics by women living far from and near the clinic

Distance from clinic	**Used ANC**	**Did not use ANC**	**Total**
Less than 10 km	O1= 51 **E1=?**	O2=29 E2=35.6	80
10 km or more	O3=35 E3=41.6	O4=40 E4=33.4	75
Total	**86**	**69**	**155**

(a) 32.9 (b) 44.4 (c) 59.3 (d) 41.6

Q 1.16 A vertical bar chart is sometimes called a column bar chart **True / False**

Q 1.17 Convenience Sampling is also a type of probability sampling **True / False**

Q 1.18 If two cards are selected, without replacement, from a deck, then the probability of selecting a diamond and then selecting a spade is **169/2704** **True / False**

Q2 We want to see – whether any significant difference in height & weight between males and females is there or not. Input and output table is given below. **(12 Marks)**

Table 1: Height and Weight of Student by Sex

S. No.	Gender	Height (in cms)	Weight(in Kgs)	S. No.	Gender	Height (in cms)	Weight(in Kgs)
1	1	128	64	6	2	116	64
2	2	124	66	7	2	122	64
3	2	136	62	8	1	138	68
4	1	153	70	9	1	151	66
5	1	144	68	10	2	118	66

Table 2: Group Statistics

	Gender	N	Mean	Std. Deviation	Std. Error Mean
Height (in cms)	Male	10	164.40	8.809	2.786
	Female	10	160.20	5.534	1.750
Weight (in Kgs)	Male	10	67.80	8.066	2.551
	Female	10	66.20	5.514	1.744

Table 3: Independent Samples Test

		t-test for Equality of Means						
							95% Confidence Interval of the Difference	
		T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Height (in cms)	Equal variances assumed	3.413	8	.009	19.600	5.743	6.357	32.843
	Equal variances not assumed	3.413	7.502	.010	19.600	5.743	6.202	32.998
Weight (in Kgs)	Equal variances assumed	2.214	8	.058	2.800	1.265	-.117	5.717
	Equal variances not assumed	2.214	7.339	.061	2.800	1.265	-.163	5.763

Assume critical values for the t distribution **= 2.306** at 8 degree of freedom and **interpret** the output table of SPSS.

Q3. Define (Attempt Any Five questions) **(8 Marks)**

(i) Statistics and Biostatistics
(ii) Population & Sample
(iii) Variable and Indicator
(iv) Correlation and Simple linear regression
(v) When Chi test and t test can be used
(vi) Rate and Ratio
(vii) Ordinal, Nominal & Scale Variable
(viii) Mean and Standard Deviation

Part II: (Attempt **Any two** questions) **(Not more than 2 page) (20 Marks)**

Q4. What is difference between probability sampling and non-probability sampling. Describe one Probability Sampling Method and One Non- probability Sampling Method

Q 5: What do you understand about data and Describe different source of data in detail?

Q 6 What are characteristics of binomial and normal distribution?

Part III: **(21 Marks)**

Q7 A preliminary random sample of 50 children is selected from 4000 children living in a particular village and it is found that 30 of them have ascariasis. How large a sample must be selected to be 95% confident that the estimate of P will not differ from the true P by more that 5 percentage points? **(7 Marks)**

OR

A district medical officer seeks to estimate the proportion of children in the district Receiving appropriate childhood vaccination. Assuming a simple random sample of a community is to be selected, **how many children must be studied** if the resulting estimate is to fall within 10 percentage points of the true proportion with 95% confidence?
Note: Use formula or Below table to estimate the sample size (7 Marks)

Q8 The Probability of Dying after a Heart Attack- The likelihood that a patient with a heart attack dies of the attack is 0.04 (i.e., 4 of 100 die of the attack). Suppose we have 5 patients who suffer a heart attack, what is the probability that all will survive? **(7 Marks)**

OR

What is the probability that a z picked at random from the population of z's will have value between -2.55 and +2.55? **Note: Use Below table to estimate the Z value**

Q9 Find Pearson correlation coefficients (r) of Height and CV variables? **(7 Marks)**

Table : Height and Spine SEP Measurement (CV) from Stimulation of Digit for 42 Subjects

Height (X)	CV (Y)	X2	Y2	XY	Height (X)	CV (Y)	X2	Y2	XY
149	14.4	22201	207.36	2145.6	171	16.5	29241	272.25	2821.5
155	13.5	24025	182.25	2092.5	172	17.0	29584	289.00	2924.0
156	13.0	24336	169.00	2028.0	173	16.8	29929	282.24	2906.4
157	14.3	24649	204.49	2245.1	174	15.5	30276	240.25	2697.0
158	14.0	24964	196.00	2212.0	175	16.6	30625	275.56	2905.0
160	15.4	25600	237.16	2464.0	175	17.0	30625	289.00	2975.0
160	14.7	25600	216.09	2352.0	176	17.3	30976	299.29	3044.8
161	15.8	25921	249.64	2543.8	177	17.2	31329	295.84	3044.4
162	14.7	26244	216.09	2381.4	179	17.8	32041	316.84	3186.2
163	15.1	26569	228.01	2461.3	180	18.0	32400	324.00	3240.0
163	14.6	26569	213.16	2379.8	181	18.4	32761	338.56	3330.4
164	17.0	26896	289.00	2788.0	181	16.4	32761	268.96	2968.4
164	16.3	26896	265.69	2673.2	182	18.0	33124	324.00	3276.0
165	15.7	27225	246.49	2590.5	182	17.9	33124	320.41	3257.8
166	14.1	27556	198.81	2340.6	184	18.4	33856	338.56	3385.6
166	14.2	27556	201.64	2357.2	185	19.0	34225	361.00	3515.0
167	16.7	27889	278.89	2788.9	187	19.1	34969	364.81	3571.7
167	16.5	27889	272.25	2755.5	187	19.2	34969	368.64	3590.4
168	16.3	28224	265.69	2738.4	188	17.5	35344	306.25	3290.0
170	17.0	28900	289.00	2890.0	189	18.8	35721	353.44	3553.2
170	16.4	28900	268.96	2788.0	190	18.3	36100	334.89	3477.0
Total					**7199**	**690.4**	**1238589**	**11459.46**	**118975.6**
Average					**171.40**	**16.44**			

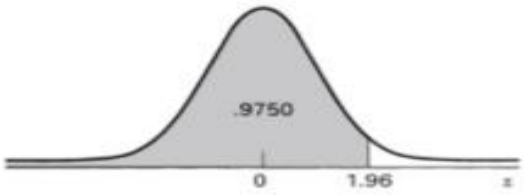
Table 1b: Sample Size to Estimate P to Within **d** Absolute Percentage Points with **95%** Confidence

Anticipated Population Proportion (**P**)

d	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95
0.01	1825	3457	4898	6147	7203	8067	8740	9220	9508	9604	9508	9220	8740	8067	7203	6147	4898	3457	1825
0.02	456	864	1225	1537	1801	2017	2185	2305	2377	2401	2377	2305	2185	2017	1801	1537	1225	864	456
0.03	203	384	544	683	800	896	971	1024	1056	1067	1056	1024	971	896	800	683	544	384	203
0.04	114	216	306	384	450	504	546	576	594	600	594	576	546	504	450	384	306	216	114
0.05	73	138	196	246	288	323	350	369	380	384	380	369	350	323	288	246	196	138	73
0.06	51	96	136	171	200	224	243	256	264	267	264	256	243	224	200	171	136	96	51
0.07	37	71	100	125	147	165	178	188	194	196	194	188	178	165	147	125	100	71	37
0.08	29	54	77	96	113	126	137	144	149	150	149	144	137	126	113	96	77	54	29
0.09	23	43	60	76	89	100	108	114	117	119	117	114	108	100	89	76	60	43	23
0.10	18	35	49	61	72	81	87	92	95	96	95	92	87	81	72	61	49	35	18
0.11	15	29	40	51	60	67	72	76	79	79	79	76	72	67	60	51	40	29	15
0.12	13	24	34	43	50	56	61	64	66	67	66	64	61	56	50	43	34	24	13
0.13	11	20	29	36	43	48	52	55	56	57	56	55	52	48	43	36	29	20	11
0.14	9	18	25	31	37	41	45	47	49	49	49	47	45	41	37	31	25	18	9
0.15	8	15	22	27	32	36	39	41	42	43	42	41	39	36	32	27	22	15	8
0.20	5	9	12	15	18	20	22	23	24	24	24	23	22	20	18	15	12	9	5
0.25	*	6	8	10	12	13	14	15	15	15	15	15	14	13	12	10	8	6	*

* Sample size less than 5

TABLE D Normal Curve Areas $P(z \leq z_0)$. Entries in the Body of the Table Are Areas Between $-\infty$ and z



z	−0.09	−0.08	−0.07	−0.06	−0.05	−0.04	−0.03	−0.02	−0.01	0.00	z
−3.80	.0001	.0001	.0001	.0001	.0001	.0001	.0001	.0001	.0001	.0001	−3.80
−3.70	.0001	.0001	.0001	.0001	.0001	.0001	.0001	.0001	.0001	.0001	−3.70
−3.60	.0001	.0001	.0001	.0001	.0001	.0001	.0001	.0001	.0002	.0002	−3.60
−3.50	.0002	.0002	.0002	.0002	.0002	.0002	.0002	.0002	.0002	.0002	−3.50
−3.40	.0002	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	−3.40
−3.30	.0003	.0004	.0004	.0004	.0004	.0004	.0004	.0005	.0005	.0005	−3.30
−3.20	.0005	.0005	.0005	.0006	.0006	.0006	.0006	.0006	.0007	.0007	−3.20
−3.10	.0007	.0007	.0008	.0008	.0008	.0008	.0009	.0009	.0009	.0010	−3.10
−3.00	.0010	.0010	.0011	.0011	.0011	.0012	.0012	.0013	.0013	.0013	−3.00
−2.90	.0014	.0014	.0015	.0015	.0016	.0016	.0017	.0018	.0018	.0019	−2.90
−2.80	.0019	.0020	.0021	.0021	.0022	.0023	.0023	.0024	.0025	.0026	−2.80
−2.70	.0026	.0027	.0028	.0029	.0030	.0031	.0032	.0033	.0034	.0035	−2.70
−2.60	.0036	.0037	.0038	.0039	.0040	.0041	.0043	.0044	.0045	.0047	−2.60
−2.50	.0048	.0049	.0051	.0052	.0054	.0055	.0057	.0059	.0060	.0062	−2.50
−2.40	.0064	.0066	.0068	.0069	.0071	.0073	.0075	.0078	.0080	.0082	−2.40
−2.30	.0084	.0087	.0089	.0091	.0094	.0096	.0099	.0102	.0104	.0107	−2.30

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	z
0.00	.5000	.5040	.5080	.5120	.5160	.5199	.5239	.5279	.5319	.5359	0.00
0.10	.5398	.5438	.5478	.5517	.5557	.5596	.5636	.5675	.5714	.5753	0.10
0.20	.5793	.5832	.5871	.5910	.5948	.5987	.6026	.6064	.6103	.6141	0.20
0.30	.6179	.6217	.6255	.6293	.6331	.6368	.6406	.6443	.6480	.6517	0.30
0.40	.6554	.6591	.6628	.6664	.6700	.6736	.6772	.6808	.6844	.6879	0.40
0.50	.6915	.6950	.6985	.7019	.7054	.7088	.7123	.7157	.7190	.7224	0.50
0.60	.7257	.7291	.7324	.7357	.7389	.7422	.7454	.7486	.7517	.7549	0.60
0.70	.7580	.7611	.7642	.7673	.7704	.7734	.7764	.7794	.7823	.7852	0.70
0.80	.7881	.7910	.7939	.7967	.7995	.8023	.8051	.8078	.8106	.8133	0.80
0.90	.8159	.8186	.8212	.8238	.8264	.8289	.8315	.8340	.8365	.8389	0.90
1.00	.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8599	.8621	1.00
1.10	.8643	.8665	.8686	.8708	.8729	.8749	.8770	.8790	.8810	.8830	1.10
1.20	.8849	.8869	.8888	.8907	.8925	.8944	.8962	.8980	.8997	.9015	1.20
1.30	.9032	.9049	.9066	.9082	.9099	.9115	.9131	.9147	.9162	.9177	1.30
1.40	.9192	.9207	.9222	.9236	.9251	.9265	.9279	.9292	.9306	.9319	1.40
1.50	.9332	.9345	.9357	.9370	.9382	.9394	.9406	.9418	.9429	.9441	1.50
1.60	.9452	.9463	.9474	.9484	.9495	.9505	.9515	.9525	.9535	.9545	1.60
1.70	.9554	.9564	.9573	.9582	.9591	.9599	.9608	.9616	.9625	.9633	1.70
1.80	.9641	.9649	.9656	.9664	.9671	.9678	.9686	.9693	.9699	.9706	1.80
1.90	.9713	.9719	.9726	.9732	.9738	.9744	.9750	.9756	.9761	.9767	1.90
2.00	.9772	.9778	.9783	.9788	.9793	.9798	.9803	.9808	.9812	.9817	2.00
2.10	.9821	.9826	.9830	.9834	.9838	.9842	.9846	.9850	.9854	.9857	2.10
2.20	.9861	.9864	.9868	.9871	.9875	.9878	.9881	.9884	.9887	.9890	2.20
2.30	.9893	.9896	.9898	.9901	.9904	.9906	.9909	.9911	.9913	.9916	2.30
2.40	.9918	.9920	.9922	.9925	.9927	.9929	.9931	.9932	.9934	.9936	2.40
2.50	.9938	.9940	.9941	.9943	.9945	.9946	.9948	.9949	.9951	.9952	2.50
2.60	.9953	.9955	.9956	.9957	.9959	.9960	.9961	.9962	.9963	.9964	2.60