Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
(TAKE HOME)
SEMESTER II
SESSION 2019/2020

COURSE NAME	:	EDUCATIONAL DATA REASONING
COURSE CODE	:	BBD 30402
PROGRAM CODE	:	BBA / BBB / BBC/ BBD / BBE / BBF / BBG
EXAMINATION DATE	:	JULY 2020
DURATION	:	24 HOURS
INSTRUCTION	:	ANSWER **ALL** QUESTIONS

THIS QUESTION PAPER CONSISTS OF **TWELVE (12)** PAGES

Q1 A group of researcher from UTHM were doing a research to explore the factors that impact on respondent's psychological adjustment and wellbeing during Restricted Movement Order (RMO) phase one (1) until phase three (3). The survey contained a variety of validated scales measuring constructs that the extensive literature on stress and coping suggest influence people's experience of stress. The scales measured self-esteem, optimism, perceptions of control, perceived stress, positive and negative affect, and life satisfaction. The survey was distributed among UTHM staffs and family members The final sample size was 439, consisting of 42 percent males and 58 percent females, with ages ranges from 18 to 82. The questionnaire for this research as **Appendix 1** and SPSS data file as **survey.sav**.

a Based on this Questionnaire as **Appendix 1** and SPSS data file "**survey.sav.**", determine the normality for the following variables this research using SPSS and interpret the output.
i. self-esteem
ii. social desirability
iii. life satisfaction

(9 marks)

b . The researcher would like to identify the difference between gender and three variables (self-esteem, social desirability, and life satisfaction).

i. Develop the null and alternative hypotheses for the analysis purpose mentioned above

(6 marks)

ii. State the appropriate statistical tests to test the hypotheses in Q1(b)(i). Give a reason.

(3 marks)

iii. Assumed the data are normal distributed, run the statistical test that you stated in Q1(b)(ii) using $\alpha = 0.05$ level of significance, interpret the output and make a conclusion.

(7 marks)

Q2 a. One of the research from the study stated in Q1, has read a lot of previous research report, and found out that perceived stress and perceived control of internal state is highly related. These two factors contribute to respondents' psychological adjustment and wellbeing during Restricted Movement Order (RMO) phase one (1) until phase three (3).

i If the researcher would like to investigate the relationship between the perceived stress (as label **Tpstress**) and perceived control of internal state (as label **Tpcoiss**) based on the obtained data in SPSS data file "**survey.sav**", suggest the suitable statistical tests to analyze the data. State the justifications for the selected statistical tests.

(6 marks)

ii. State the hypotheses for the purpose of study in **Q2**(a)(i).

(4 marks)

iii. Assumed the data are normal distributed, at the $\alpha = 0.05$ level of significance, run the analysis of the data in SPSS data file "**survey.sav**" to test the hypotheses in Q2(a)(ii). Interpret the output and make a conclusion..

(10 marks)

b After the RMO, the statistic lecturer would like to determine whether his students test performance is equal or not in terms of grade. The final grades given to his undergraduate statistics classes were label as A, B, C, D, and F. The observed frequencies are: A= 6, B= 24, C= 50, D= 10, F= 10. He run the statistical analysis and the SPSS output is shown in Figure Q2(b). What can you conclude from the results shown in Figure Q2(b)?

(5 marks)

Figure Q2(b)

Grade

	Observed N	Expected N	Residual
F	10	20.0	-10.0
D	10	20.0	-10.0
C	50	20.0	30.0
B	24	20.0	4.0
A	6	20.0	-14.0
Total	100		

Test Statistics

	Grade
Chi-Square[a]	65.600
df	4
Asymp. Sig.	.000

a. 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 20.0.

Q3 a. i. A school teacher was collecting data about exams in each of her classes from the previous year. Sketch a scatter plot for the collected data as shown below:

Class	Math	English	History	Computer	Biology	Arts
Period	2	4	1	5	3	6
Average Score	95	60	75	85	92	83

(5 marks)

ii. The test scores for nine students in Physics and Mathematics subjects for a tuition teacher are as follows:

Physics : 35, 23, 47, 17, 10, 43, 9, 6, 28
Mathematics : 30, 33, 45, 23, 8, 49, 12, 4, 31

Help the teacher to determine the relationship between these two subjects by using Spearman rank and make a conclusion.

(5 marks)

iii Marks obtained by 5 students in algebra and trigonometry as given below:

Algebra	15	16	12	10	8
Trigonometry	18	11	10	20	17

Calculate the Pearson correlation coefficient and make a conclusion.

(5 marks)

b. Data from a study on morale and its influence on workers and employers by ranking the factors given are showed as below:

Factors	Employer	Work
Praise for workers	1	7
Great job	2	3
Fair pay	3	1
Understanding and Acceptance	4	5
Counselling on personal issues	5	8
Promotion based on merit	6	4
Convenient workplace	7	6
Safety working	8	2

Calculate the r value using both Spearman rank and Pearson r. Compare both r value and give your opinion on it.

(10 marks)

Q4 a. Table Q4(a) shows the hours of relief provided by two analgesic medicines (label as A and B) in 12 patients suffering from arthritis. In order to proof that one medicines provides longer relief than the other, analysis of the gathered data is needed. Assumed the data are not normal distributed, develop the 2 tailed hypotheses, select an appropriate statistical test to test the hypotheses using $\alpha = 0.05$ level of significance. Interpret the obtained value based on your calculation and make a conclusion.

Table Q4(a)

Patient	Medicine A	Medicine B	Patient	Medicine A	Medicine B
1	2.0	3.5	7	14.9	16.7
2	3.6	5.7	8	6.6	6.0
3	2.6	2.9	9	2.3	3.8
4	2.6	2.4	10	2.0	4.0
5	7.3	9.9	11	6.8	9.1
6	3.4	3.3	12	8.5	20.9

(13 marks)

b. Table Q4(b) shows data on traffic flow as recorded in the centre and at the edge of CBD over five-minute periods at different times of a day.

Table Q4(b)

Sample	CBD centre	CBD edge
1	220	143
2	150	88
3	162	56
4	110	97
5	62	42
6	85	40
7	46	63
8	102	88

i. State the null hypothesis and the alternative hypothesis if a researcher would like to study on the difference of traffic flow between the centre and at the edge of CBD.

(4 marks)

ii Assumed the data are not normal distributed , test the hypotheses in Q4(b)(i) by using the suitable statistical test with $\alpha = 0.05$ level of significance (2 tailed). Interpret the findings and make a conclusion.

(8 marks)

-END OF QUESTION-

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$$\chi^2 = \sum_i \frac{(O-E)^2}{E}$$

$$U_1 = n_1 n_2 + n_1 \frac{n_1 + 1}{2} - R_1$$

$$U_2 = n_1 n_2 + n_2 \frac{n_2 + 1}{2} - R_2$$

$$Z = \frac{\bar{X} - \mu}{\frac{\sigma}{\sqrt{n}}}$$

$$r = \frac{\sum XY - N\bar{X}\bar{Y}}{\sqrt{(\sum X^2 - N\bar{X}^2)(\sum Y^2 - NY^2)}}$$

$$T - tests \ : T = r_p \sqrt{\frac{n-2}{1 - r_p{}^2}}$$

$$r_s = 1 - \frac{6\sum d^2}{n(n^2 - 1)}$$

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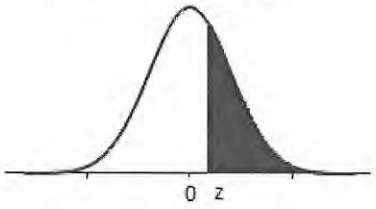
Probabilities Associated with Values as Extreme as Observed Value of Z in the Normal Curve of distribution



z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.5000	0.4960	0.4920	0.4880	0.4840	0.4801	0.4761	0.4721	0.4681	0.4641
0.1	0.4602	0.4562	0.4522	0.4483	0.4443	0.4404	0.4364	0.4325	0.4286	0.4247
0.2	0.4207	0.4168	0.4129	0.4090	0.4052	0.4013	0.3974	0.3936	0.3897	0.3859
0.3	0.3821	0.3783	0.3745	0.3707	0.3669	0.3632	0.3594	0.3557	0.3520	0.3483
0.4	0.3446	0.3409	0.3372	0.3336	0.3300	0.3264	0.3228	0.3192	0.3156	0.3121
0.5	0.3085	0.3050	0.3015	0.2981	0.2946	0.2912	0.2877	0.2843	0.2810	0.2776
0.6	0.2743	0.2709	0.2676	0.2643	0.2611	0.2578	0.2546	0.2514	0.2483	0.2451
0.7	0.2420	0.2389	0.2358	0.2327	0.2296	0.2266	0.2236	0.2206	0.2177	0.2148
0.8	0.2119	0.2090	0.2061	0.2033	0.2005	0.1977	0.1949	0.1922	0.1894	0.1867
0.9	0.1841	0.1814	0.1788	0.1762	0.1736	0.1711	0.1685	0.1660	0.1635	0.1611
1.0	0.1587	0.1562	0.1539	0.1515	0.1492	0.1469	0.1446	0.1423	0.1401	0.1379
1.1	0.1357	0.1335	0.1314	0.1292	0.1271	0.1251	0.1230	0.1210	0.1190	0.1170
1.2	0.1151	0.1131	0.1112	0.1093	0.1075	0.1056	0.1038	0.1020	0.1003	0.0985
1.3	0.0968	0.0951	0.0934	0.0918	0.0901	0.0885	0.0869	0.0853	0.0838	0.0823
1.4	0.0808	0.0793	0.0778	0.0764	0.0749	0.0735	0.0721	0.0708	0.0694	0.0681
1.5	0.0668	0.0655	0.0643	0.0630	0.0618	0.0606	0.0594	0.0582	0.0571	0.0559
1.6	0.0548	0.0537	0.0526	0.0516	0.0505	0.0495	0.0485	0.0475	0.0465	0.0455
1.7	0.0446	0.0436	0.0427	0.0418	0.0409	0.0401	0.0392	0.0384	0.0375	0.0367
1.8	0.0359	0.0351	0.0344	0.0336	0.0329	0.0322	0.0314	0.0307	0.0301	0.0294
1.9	0.0287	0.0281	0.0274	0.0268	0.0262	0.0256	0.0250	0.0244	0.0239	0.0233

Read values of Z to one decimal place down the left hand column, *Column z.* Read across Row z for values to two decimal places. The probabilities contained in the table are *one-tailed.* For two-tailed tests, multiply by 2.

Examples

The probability of a $Z \geq 0.14$ on a one-tailed test is $\rho = 0.4443$.

The probability of a $Z \geq 1.98$ on a two-tailed test is $\rho = 2 \times (0.0239) = 0.0478$

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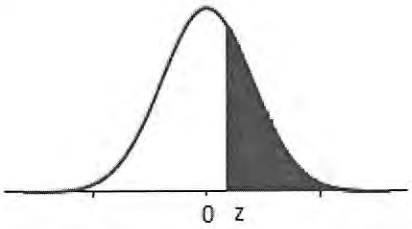
Probabilities Associated with Values as Extreme as Observed Value of z in the Normal Curve of Distribution (continued)



z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
2.0	0.0228	0.0222	0.0217	0.0212	0.0207	0.0202	0.0197	0.0192	0.0188	0.0183
2.1	0.0179	0.0174	0.0170	0.0166	0.0162	0.0158	0.0154	0.0150	0.0146	0.0143
2.2	0.0139	0.0136	0.0132	0.0129	0.0125	0.0122	0.0119	0.0116	0.0113	0.0110
2.3	0.0107	0.0104	0.0102	0.0099	0.0096	0.0094	0.0091	0.0089	0.0087	0.0084
2.4	0.0082	0.0080	0.0078	0.0075	0.0073	0.0071	0.0069	0.0068	0.0066	0.0064
2.5	0.0062	0.0060	0.0059	0.0057	0.0055	0.0054	0.0052	0.0051	0.0049	0.0048
2.6	0.0047	0.0045	0.0044	0.0043	0.0041	0.0040	0.0039	0.0038	0.0037	0.0036
2.7	0.0035	0.0034	0.0033	0.0032	0.0031	0.0030	0.0029	0.0028	0.0027	0.0026
2.8	0.0026	0.0025	0.0024	0.0023	0.0023	0.0022	0.0021	0.0021	0.0020	0.0019
2.9	0.0019	0.0018	0.0018	0.0017	0.0016	0.0016	0.0015	0.0015	0.0014	0.0014
3.0	0.0013	0.0013	0.0013-	0.0012	0.0012	0.0011	0.0011	0.0011	0.0010	0.0010
3.1	0.0010	0.0009	0.0009	0.0009	0.0008	0.0008	0.0008	0.0008	0.0007	0.0007
3.2	0.0007									
3.3	0.0005									
3.4	0.0003									
3.5	0.00023									
3.6	0.00016									
3.7	0.00011									
3.8	0.00007									
3.9	0.00005									
4.0	0.00003									

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χ^2 Distribution

Level of significance

Degrees of freedom	0.05	0.01
1	3.84	6.63
2	5.99	9.21
3	7.81	11.34
4	9.49	13.28
5	11.07	15.09
6	12.59	16.81
7	14.07	18.48
8	15.51	20.09
9	16.92	21.67
10	18.31	23.21
11	19.68	24.72
12	21.03	26.22
13	22.36	27.69
14	23.68	29.14
15	25.00	30.58
16	26.30	32.00
17	27.59	33.41
18	28.87	34.81
19	30.14	36.19
20	31.41	37.57
21	32.67	38.93
22	33.92	40.29
23	35.17	41.64
24	36.42	42.98
25	37.65	44.31
26	38.89	45.64
27	40.11	46.96
28	41.34	48.28
29	42.56	49.59
30	43.77	50.89
40	55.76	63.69
50	67.50	76.15
60	79.08	88.38
70	90.53	100.43
80	101.88	112.33
90	113.15	124.12
100	124.34	135.81

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Spearman Rank Correlation Coefficient Values

	Significance level (one-tailed test)	
N	0.05	0.01
4	1.000	
5	0 900	1 000
6	0 829	0 943
7	0.714	0.893
8	0.643	0.833
9	0.600	0.783
10	0.564	0.746
12	0.506	0.712
14	0.456	0.645
16	0.425	0.601
18	0.399	0.564
20	0.377	0.534
22	0.359	0.508
24	0.343	0.485
26	0.329	0.465
28	0.317	0.448
30	0.306	0.432

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Mann-Whitney *U* Test Values (Two-Tailed Test)

Equal sample sizes

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
0.05	-	-	-	0	2	5	8	13	17	23	30	37	45	55	64	75	87	99	113	127	142	158	175	192	211
0.01	-	-	-	-	0	2	4	7	11	16	21	27	34	42	51	60	70	81	93	105	118	133	148	164	180

n	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
0.05	230	250	272	294	317	341	365	391	418	445	473	503	533	564	596	628	662	697	732	769	806	845	884	924	965
0.01	198	216	235	255	276	298	321	344	369	394	420	447	475	504	533	564	595	627	660	694	729	765	802	839	877

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Mann-Whitney *U* Test Values (Two-Tailed Test)

n_L – larger sample size

n_S smaller sample size

0.05	n_S \ n_L	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	n_S \ n_L	0.05
	2		-	-	-	-	-	0	0	0	0	1	1	1	1	1	2	2	2	2	3	3	3	3	3	2	
	3	-		-	0	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10	10	3	
	4	-	-		1	2	3	4	4	5	6	7	8	9	10	11	11	12	13	14	15	16	17	17	18	4	
	5	-	-	-		3	5	6	7	8	9	11	12	13	14	15	17	18	19	20	22	23	24	25	27	5	
	6			0	1		6	8	11	11	11	11	11	11	11	21	22	24	25	27	29	30	32	33	35	6	
	7	-	-	0	1	3		1	1	1	1	1	2	2	2	26	28	30	32	34	36	38	40	42	44	7	
	8	-	-	1	2	4	6		1	1	1	2	2	2	2	31	34	36	38	41	43	45	48	50	53	8	
	9	-	0	1	3	5	7	9		2	2	2	2	3	3	37	39	42	45	48	50	53	56	59	62	9	
	10	-	0	2	4	6	9	1	1		2	2	3	3	3	42	45	48	52	55	58	61	64	67	71	10	
	11	-	0	2	5	7	1	1	1	1		3	3	4	4	47	51	55	58	62	65	69	73	76	80	11	
	12	-	1	3	6	9	1	1	1	2	2		4	4	4	53	57	61	65	69	73	77	81	85	89	12	
	13	-	1	3	7	1	1	1	2	2	2	3		5	5	59	63	67	72	76	80	85	89	94	98	13	
	14	-	1	4	7	1	1	1	2	2	3	3	3		5	64	69	74	78	83	88	93	98	10	10	14	
	15	-	2	5	8	1	1	2	2	2	3	3	4	4		70	75	80	85	90	96	10	10	11	11	15	
	16	-	2	5	9	1	1	2	2	3	3	4	4	5	5		81	86	92	98	10	10	11	12	12	16	
	17	-	2	6	1	1	1	2	2	3	3	4	4	5	6	65		93	99	10	11	11	12	12	13	17	
	18	-	2	6	1	1	2	2	3	3	4	4	5	5	6	70	75		10	11	11	12	13	13	14	18	
	19	0	3	7	1	1	2	2	3	3	4	5	5	6	6	74	81	87		11	12	13	14	14	15	19	
	20	0	3	8	1	1	2	3	3	4	4	5	6	6	7	79	86	92	99		13	14	14	15	16	20	
	21	0	3	8	1	1	2	3	3	4	5	5	6	7	7	84	91	98	10	11		15	15	16	17	21	
	22	0	4	9	1	2	2	3	4	4	5	6	6	7	8	89	96	10	11	11	12		16	17	18	22	
	23	0	4	9	1	2	2	3	4	5	5	6	7	7	8	94	10	10	11	12	13	14		18	19	23	
	24	0	4	1	1	2	3	3	4	5	6	6	7	8	9	99	10	11	12	13	13	14	15		20	24	
	25	0	4	1	1	2	3	3	4	5	6	7	7	8	9	10	11	12	12	13	14	15	16	17		25	
0.01	n_S \ n_L	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	27	25	n_S \ n_L	0.01

Source: Table 5.3, of Neave, H. R., *Statistics Tables.* London: George Allen & Unwin, 1978, p. 53, with the kind permission of the author and publisher