UNIVERSITI SAINS MALAYSIA

Final Examination
2016/2017 Academic Session

May/June 2017

JMG 317E/JMG 413E – Quantitative Geography
[Geografi Kuantitatif]

Ducation : 3 hours
[Masa: 3 jam]

Please ensure that this examination paper contains **TEN** printed pages before you begin the examination.
[Sila pastikan bahawa kertas peperiksaan ini mengandungi SEPULUH muka surat yang bercetak sebelum anda memulakan peperiksaan ini.]

Answer **FOUR** (4) questions only. If you answer more than four questions, only the first four will be graded. You may answer either in Bahasa Malaysia or in English.
*[Jawab **EMPAT** (4) soalan sahaja. Jika calon menjawab lebih daripada empat soalan, hanya empat soalan pertama mengikut susunan dalam skrip jawapan akan diberi markah. Anda dibenarkan menjawab sama ada dalam Bahasa Malaysia atau Bahasa Inggeris.]*

Read the instructions carefully before answering.
[Baca arahan dengan teliti sebelum menjawab soalan.]

Each question is worth 25 marks.
[Setiap soalan diperuntukkan 25 markah.]

In the event of any discrepancies, the English version shall be used.
[Sekiranya terdapat sebarang percanggahan pada soalan peperiksaan, versi Bahasa Inggeris hendaklah diguna pakai.]

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1. (a) What is the difference between sample mean and sample median?
[Apakah perbezaan antara min sampel dengan median sampel?]

(5 marks/*markah*)

(b) What is the difference between simple random sampling and stratified sampling?
[Apakah perbezaan antara persampelan rawak mudah dan persampelan berstrata?]

(5 marks/*markah*)

(c) What is normal distribution?
[Apakah itu taburan normal?]

(5 marks/*markah*)

(d) What is the difference between confidence interval and significant level?
[Apakah perbezaan antara selang keyakinan dan aras signifikan?]

(5 marks/*markah*)

(e) What is spatial pattern?
[Apakah itu corak ruangan?]

(5 marks/*markah*)

2. Calculate standard deviation and skewness of the following data set. Show your work.
43, 6, 7, 11, 12, 41, 21, 17, 1, 3
[Kira sisihan piawai dan keserongan bagi set data berikut. Tunjukkan jalan kerja anda.]
[43, 6, 7, 11, 12, 41, 21, 17, 1, 3]

(25 marks/*markah*)

3. (a) What is multiple regression?
[Apakah itu regresi berganda?]

(5 marks/*markah*)

(b) Table 1 shows data on spending for transport and income. Using Table 1 and appropriate formula, answer the following questions (given $s_x = 20.20$ and $s_y = 28.34$).
[Jadual 1 menunjukkan data bagi perbelanjaan untuk pengangkutan dan pendapatan. Dengan menggunakan jadual 1 dan formula yang sesuai, jawab soalan-soalan berikut, (diberi $s_x = 20.20$ dan $s_y = 28.34$).]

(i) Calculate slope, *b*
[Kira b]

(ii) Calculate correlation coefficient, *r*
[Kira r]

(iii) Calculate regression line, *y*
[Kira y]

Table 1 **Data on spending for transport and income**
[Jadual 1] ***[Data perbelanjaan untuk pengangkutan dan pendapatan]***

Amount spent / week (RM) ***[Amaun perbelanjaan / minggu]*** **(y) (RM)**	**Income ('00) / week (RM)** ***[Pendapatan '00] / minggu*** **(x) (RM)**
120	65
68	35
35	30
60	44
100	80
91	77
44	32
71	39
89	44
113	77

(20 marks/*markah*)

4. A survey of two cities is carried out to see whether there are differences in level of education. City A has a mean of 12.4 years of education among its residents and City B has a mean of 14.4 years. Fifteen residents were surveyed in each town. The sample standard deviation was 3.0 in City A and 4.0 in City B. Is there a significant difference in education between the two cities? Assume the variance are equal, state the null and alternative hypotheses and test the null hypothesis using α=0.05. Calculate the p-value and a 95% confidence interval for the difference.
[Tinjauan atas dua buah bandar dijalankan untuk melihat sama ada terdapat perbezaan dalam tahap pendidikan. Bandar A mempunyai min 12.4 tahun pendidikan dalam kalangan penduduk. Bandar B mempunyai min 14.4 tahun. Lima belas orang penduduk dikaji pada setiap Bandar. Sisihan piawai adalah 3.0 di Bandar A dan 4.0 di Bandar B. Adakah terdapat perbezaan yang signifikan dalam bidang pendidikan di antara kedua-dua bandar?Andaikan varians adalah sama, nyatakan hipotesis nul dan alternatif bagi menguji hipotesis null menggunakan α=0.05. Kira nilai-p dan 95% selang keyakinan bagi perbezaan tersebut.]

(25 marks/*markah*)

5. (a) What are the assumptions of analysis of variance?
[Apakah andaian analisis varians?]

(5 marks/*markah*)

(b) Using Table 2 and appropriate formula, answer the following questions.
[Dengan menggunakan Jadual 2 dan formula yang sesuai, jawab soalan-soalan berikut.]

(i) Calculate TSS
[Kira TSS]

(ii) Calculate BSS
[Kira BSS]

(iii) Calculate WSS
[Kira WSS]

(iv) Calculate F
[Kira F]

(20 marks/*markah*)

Table 2 Annual swimming frequencies for three regions
[Jadual 2] [Kekerapan renang tahunan untuk Tiga (3) buah kawasan]

	Annual swimming frequencies *[Kekerapan renang tahunan]*		
	Central city *[Pusat Bandar]*	**Suburbs** *[Pinggir bandar]*	**Rural** *[Luar bandar]*
	38	58	80
	42	66	70
	50	80	60
	57	62	55
	80	73	72
	70	39	73
	32	73	81
	20	58	50
Mean $\bar{x}$ = 59.96	48.63	63.63	67.63
[*Min*, $\bar{x}$ = 59.96]			
Standard deviation s = 16.69	19.88	12.66	11.43
[Sisihan piawai, s = 16.69]			

6. Choose either (a) or (b)
[Pilih sama ada (a) atau (b)]

(a) Explain the steps in Quadrat analysis.
[Terangkan langkah-langkah dalam analisis Quadrat]

(25 marks/*markah*)

(b) Explain the steps in Nearest Neighbour Analysis
[Terangkan langkah-langkah dalam Analisis Jiran Terdekat]

(25 marks/*markah*)

Lampiran 1

Jadual t

Nilai kritikal t untuk aras Probabiliti
Tahap signifikan pada ujian satu hujung

	.10	.05	.025	.01	.005	.0005
	Tahap signifikan pada ujian dua hujung					
df	**.20**	**.10**	**.05**	**.02**	**.01**	**.001**
1	3.078	6.314	12.706	31.821	63.657	636.619
2	1.886	2.920	4.303	6.965	9.925	31.598
3	1.638	2.353	3.182	4.541	5.841	12.941
4	1.533	2.132	2.776	3.747	4.604	8.610
5	1.476	2.015	2.571	3.365	4.032	6.859
6	1.440	1.943	2.447	3.143	3.707	5.959
7	1.415	1.895	2.365	2.998	3.499	5.405
8	1.397	1.860	2.306	2.896	3.355	5.041
9	1.383	1.833	2.262	2.821	3.250	4.781
10	1.372	1.182	2.228	2.764	3.169	4.587
11	1.363	1.796	2.201	2.718	3.106	4.437
12	1.356	1.782	2.681	2.681	3.055	4.318
13	1.350	1.771	2.160	2.650	3.012	4.221
14	1.345	1.761	2.145	2.624	2.977	4.140
15	1.341	1.753	2.131	2.602	2.947	4.073
16	1.337	1.746	2.120	2.583	2.921	4.015
17	1.333	1.740	2.110	2.567	2.898	3.965
18	1.330	1.734	2.101	2.552	2.878	3.922
19	1.328	1.729	3.093	2.539	2.861	3.883
20	1.325	1.725	2.086	2.528	2.845	3.850
21	1.323	1.721	2.080	2.518	2.831	3.819
22	1.321	1.717	2.074	2.508	2.819	3.792
23	1.319	1.714	2.069	2.500	2.807	3.767
24	1.318	1.711	2.064	2.492	2.797	3.745
25	1.316	1.708	2.060	2.485	2.787	3.725
26	1.315	1.706	2.056	2.479	2.779	3.707
27	1.314	1.703	2.052	2.473	2.771	3.690
28	1.313	1.701	2.048	2.467	2.763	3.674
29	1.311	1.699	2.045	2.462	2.756	3.659
30	1.310	1.697	2.042	2.457	2.750	3.646
40	1.303	1.684	2.021	2.423	2.704	3.551
60	1.296	1.671	2.000	2.390	2.660	3.460
120	1.289	1.658	1.980	2.358	2.617	3.373
∞	1.282	1.645	1.960	2.326	2.576	3.291

Sumber: Roger & Schindler, 'Business Research Methods 8th ed., McGraw Hill, 2004

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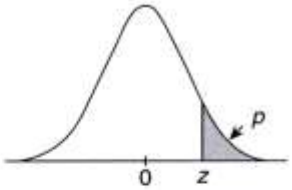
Lampiran 2

Jadual z

TABLE A.2 **Normal distribution**

The tabled entries represent the proportion p of the total area under the curve that is in the tail of the normal curve, to the right of the indicated value of *z*. (Example: .0694 or 6.94% of the area is to the right of $z = 1.48$. This is found by using the $z = 1.4$ row, and the 0.08 column, of the table.) If the value of *z* is negative, the tabled entry corresponding to the absolute value of *z* represents the area less than *z*. (Example: .3015 or 30.15% of the area is to the left of $z = -0.52$ and this is found by using $z = +0.52$ in the table.)



	Second decimal place of *z*									
z	**.00**	**.01**	**.02**	**.03**	**.04**	**.05**	**.06**	**.07**	**.08**	**.09**
0.0	.5000	.4960	.4920	.4880	.4840	.4801	.4761	.4721	.4681	.4641
0.1	.4602	.4562	.4522	.4483	.4443	.4404	.4364	.4325	.4286	.4247
0.2	.4207	.4168	.4129	.4090	.4052	.4013	.3974	.3936	.3897	.3859
0.3	.3821	.3783	.3745	.3707	.3669	.3632	.3594	.3557	.3520	.3483
0.4	.3446	.3409	.3372	.3336	.3300	.3264	.3228	.3192	.3156	.3121
0.5	.3085	.3050	.3015	.2981	.2946	.2912	.2877	.2843	.2810	.2776
0.6	.2743	.2709	.2676	.2643	.2611	.2578	.2546	.2514	.2483	.2451
0.7	.2420	.2389	.2358	.2327	.2297	.2266	.2236	.2206	.2177	.2148
0.8	.2119	.2090	.2061	.2033	.2005	.1977	.1949	.1922	.1894	.1867
0.9	.1841	.1814	.1788	.1762	.1736	.1711	.1685	.1660	.1635	.1611
1.0	.1587	.1562	.1539	.1515	.1492	.1469	.1446	.1423	.1401	.1379
1.1	.1357	.1335	.1314	.1292	.1271	.1251	.1230	.1210	.1190	.1170
1.2	.1151	.1131	.1112	.1093	.1075	.1056	.1038	.1020	.1003	.0985
1.3	.0968	.0951	.0934	.0918	.0901	.0885	.0869	.0853	.0838	.0823
1.4	.0808	.0793	.0778	.0764	.0749	.0735	.0721	.0708	.0694	.0681
1.5	.0668	.0655	.0643	.0630	.0618	.0606	.0594	.0582	.0571	.0559
1.6	0548	.0537	.0526	.0516	.0505	.0495	.0485	.0475	.0465	.0455
1.7	.0446	.0436	.0427	.0418	.0409	.0401	.0392	.0384	.0375	.0367
1.8	.0359	.0351	.0344	.0336	.0329	.0322	.0314	.0307	.0301	.0294
1.9	.0287	.0281	.0274	.0268	.0262	.0256	.0250	.0244	.0239	.0233
2.0	.0228	.0222	.0217	.0212	.0207	.0202	.0197	.0192	.0188	.0183
2.1	.0179	.0174	.0170	.0166	.0162	.0158	.0154	.0150	.0146	.0143
2.2	.0139	.0136	.0132	.0129	.0125	.0122	.0119	.0116	.0113	.0110
2.3	.0107	.0104	.0102	.0099	.0096	.0094	.0091	.0089	.0087	.0084
2.4	.0082	.0080	.0078	.0075	.0073	.0071	.0069	.0068	.0066	.0064
2.5	.0062	.0060	.0059	.0057	.0055	.0054	.0052	.0051	.0049	.0048
2.6	.0047	.0045	.0044	.0043	.0041	.0040	.0039	.0038	.0037	.0036
2.7	.0035	.0034	.0033	.0032	.0031	.0030	.0029	.0028	.0027	.0026
2.8	.0026	.0025	.0024	.0023	.0023	.0022	.0021	.0021	.0020	.0019
2.9	.0019	.0018	.0018	.0017	.0016	.0016	.0015	.0015	.0014	.0014
3.0	.0013	.0013	.0013	.0012	.0012	.0011	.0011	.0011	.0010	.0010

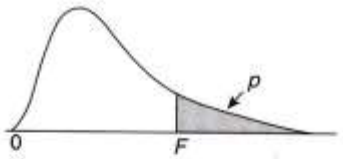
Adapted with rounding from Table II of Fisher and Yates 1974.

Lampiran 3

Jadual F-distribution

TABLE A.5 *F* distribution

For various pairs of degrees of freedom ν_1, ν_2, the tabled entries represent the critical values of F above which a proportion p of the distribution falls. (Example: for df = 4,16 an $F = 2.33$ has 10% of the area to the right of it.) Tables are provided for values of p equal to .10, .05, .01.



$p = .10$ values

Degrees of freedom for denominator ν_2	Degrees of freedom for numerator ν_1																	
	1	2	3	4	5	6	7	8	9	10	12	15	20	30	40	60	120	∞
1	39.86	49.50	53.59	55.83	57.24	58.20	58.91	59.14	59.86	60.19	60.71	61.22	61.71	62.26	62.53	62.79	63.06	63.33
2	8.53	9.00	9.16	9.24	9.29	9.33	9.35	9.37	9.38	9.39	9.41	9.42	9.41	9.46	9.47	9.47	9.48	9.49
3	5.54	5.46	5.39	5.34	5.31	5.28	5.27	5.25	5.24	5.23	5.22	5.20	5.18	5.17	5.16	5.15	5.14	5.13
4	4.54	4.32	4.19	4.11	4.05	4.01	3.98	3.95	3.94	3.92	3.90	3.87	3.84	3.82	3.80	3.79	3.78	3.76
5	4.06	3.78	3.62	3.52	3.45	3.40	3.37	3.34	3.32	3.30	3.27	3.24	3.21	3.17	3.16	3.14	3.12	3.10
6	3.78	3.46	3.29	3.18	3.11	3.05	3.01	2.98	2.96	2.94	2.90	2.87	2.84	2.80	2.78	2.76	2.74	2.72
7	3.59	3.26	3.07	2.96	2.88	2.83	2.78	2.75	2.72	2.70	2.67	2.63	2.59	2.56	2.54	2.51	2.49	2.47
8	3.46	3.11	2.92	2.81	2.73	2.67	2.62	2.59	2.56	2.54	2.50	2.46	2.42	2.38	2.36	2.34	2.32	2.29
9	3.36	3.01	2.81	2.69	2.61	2.55	2.51	2.47	2.44	2.42	2.38	2.34	2.30	2.25	2.23	2.21	2.18	2.16
10	3.29	2.92	2.73	2.61	2.52	2.46	2.41	2.38	2.35	2.32	2.28	2.24	2.20	2.16	2.13	2.11	2.08	2.06
11	3.23	2.86	2.66	2.54	2.45	2.39	2.34	2.30	2.27	2.25	2.21	2.17	2.12	2.08	2.05	2.03	2.00	1.97
12	3.18	2.81	2.61	2.48	2.39	2.33	2.28	2.24	2.21	2.19	2.15	2.10	2.06	2.01	1.99	1.96	1.93	1.90
13	3.14	2.76	2.56	2.43	2.35	2.28	2.23	2.20	2.16	2.14	2.10	2.05	2.01	1.96	1.93	1.90	1.88	1.85
14	3.10	2.73	2.52	2.39	2.31	2.24	2.19	2.15	2.12	2.10	2.05	2.01	1.96	1.91	1.89	1.86	1.83	1.80
15	3.07	2.70	2.49	2.36	2.27	2.21	2.16	2.12	2.09	2.06	2.02	1.97	1.92	1.87	1.85	1.82	1.79	1.76
16	3.05	2.67	2.46	2.33	2.24	2.18	2.13	2.09	2.06	2.03	1.99	1.94	1.89	1.84	1.81	1.78	1.75	1.72
17	3.03	2.64	2.44	2.31	2.22	2.15	2.10	2.06	2.03	2.00	1.96	1.91	1.86	1.81	1.78	1.75	1.72	1.69
18	3.01	2.62	2.42	2.29	2.20	2.13	2.08	2.04	2.00	1.98	1.93	1.89	1.84	1.78	1.75	1.72	1.69	1.66
19	2.99	2.61	2.40	2.27	2.18	2.11	2.06	2.02	1.98	1.96	1.91	1.86	1.81	1.76	1.73	1.70	1.67	1.63
20	2.97	2.59	2.38	2.25	2.16	2.09	2.04	2.00	1.96	1.94	1.89	1.84	1.79	1.74	1.71	1.68	1.64	1.61
21	2.96	2.57	2.36	2.23	2.14	2.08	2.02	1.98	1.95	1.92	1.87	1.83	1.78	1.72	1.69	1.66	1.62	1.59
22	2.95	2.56	2.35	2.22	2.13	2.06	2.01	1.97	1.93	1.90	1.86	1.81	1.76	1.70	1.67	1.64	1.60	1.57
23	2.94	2.55	2.34	2.21	2.11	2.05	1.99	1.95	1.92	1.89	1.84	1.80	1.74	1.69	1.66	1.62	1.59	1.55
24	2.93	2.54	2.33	2.19	2.10	2.04	1.98	1.94	1.91	1.88	1.83	1.78	1.73	1.67	1.64	1.61	1.57	1.53
30	2.88	2.49	2.28	2.14	2.05	1.98	1.93	1.88	1.85	1.82	1.77	1.72	1.67	1.61	1.57	1.54	1.50	1.46
40	2.84	2.44	2.23	2.09	2.00	1.93	1.87	1.83	1.79	1.76	1.71	1.66	1.61	1.54	1.51	1.47	1.42	1.38
60	2.79	2.39	2.18	2.04	1.95	1.87	1.82	1.77	1.74	1.71	1.66	1.60	1.54	1.48	1.44	1.40	1.35	1.29
120	2.75	2.35	2.13	1.99	1.90	1.82	1.77	1.72	1.63	1.65	1.60	1.55	1.48	1.41	1.37	1.32	1.26	1.19
∞	2.71	2.30	2.08	1.94	1.85	1.77	1.72	1.67	1.63	1.60	1.55	1.49	1.42	1.34	1.30	1.24	1.17	1.00

(Continued)

Formula:

1. $t = \dfrac{\overline{x} - \mu}{s / \sqrt{n}}$

2. $z = \dfrac{\overline{x} - \mu}{s / \sqrt{n}}$

3. $z = \dfrac{p - p_0}{\sqrt{p_0 (1 - p_0) / n}}$

4. $t = \dfrac{\overline{x}_1 - \overline{x}_2}{\sqrt{\dfrac{s^2 p}{n_1} + \dfrac{s^2 p}{n_2}}}$

5. $sp = \sqrt{\dfrac{(n_1 - 1) s_1^2 + (n_1 - 1) s_2^2}{n_1 + n_2 - 2}}$

6. $F = \dfrac{s_1^2}{s_2^2}$

7. $b = \dfrac{\sum_{i=1}^{n} (x_i - \overline{x})(y_i - \overline{y})}{\sum_{i=1}^{n} (x_i - \overline{x})^2}$

8. $a = \overline{y} - b\overline{x}$

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9. $y = a + bx$

10. $\text{TSS} = \sum_{j=1}^{k}\sum_{i=1}^{n_j}\left(X_{ij} - \bar{x}\right) = \left(n - i\right)s^2$

11. $\text{BSS} = \sum_{j=1}^{k} n_j \left(\bar{x}_j - \bar{x}\right)^2$

12. $\text{WSS} = \sum_{j=1}^{k}\sum_{i=1}^{n_j}\left(x_{ij} - \bar{x}_j\right)^2 = \sum_{j}\left(n_j - 1\right)s_j^2$

13. $F = \dfrac{\text{BSS}/\left(k-1\right)}{\text{WSS}/\left(n-k\right)}$

14. $r = \dfrac{\sum_{i-1}^{n}\left(x_i - \bar{x}\right)\left(y_i - \bar{y}\right)}{\left(n-1\right)s_x s_y}$

15. $s = \sqrt{\dfrac{\sum_{i=1}^{n}\left(x_1 - \bar{x}\right)^2}{n-1}}$

16. $\text{Skewness} = \dfrac{\sum_{i=1}^{n}\left(x_i - \bar{x}\right)^3}{ns^3}$

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