UNIVERSITI SAINS MALAYSIA

Final Examination
2017/2018 Academic Session

May/June 2018

JMG 413E – QUANTITATIVE GEOGRAPHY
[GEOGRAFI KUANTITATIF]

Duration : 3 hours
[Masa: 3 jam]

Please ensure that this examination paper contains **NINE (9)** printed pages before you begin the examination.

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.

Read the instructions carefully before answering.

Each question is worth 25 marks.

In the event of any discrepancies, the English version shall be used.

*[Sila pastikan bahawa kertas peperiksaan ini mengandungi **SEMBILAN (9)** muka surat yang bercetak sebelum anda memulakan peperiksaan ini.]*

*[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.]*

[Baca arahan dengan teliti sebelum menjawab soalan.]

[Setiap soalan diperuntukkan 25 markah.]

[Sekiranya terdapat sebarang percanggahan pada soalan peperiksaan, versi Bahasa Inggeris hendaklah diguna pakai.]

1. Explain the use of mean, median and range in describing and summarizing geographical data using example of your choice.
[Terangkan penggunaan min, median dan julat dalam menerang dan merumus data geografi dengan menggunakan contoh yang anda pilih].

(25 marks/ *markah*)

2. Discuss FOUR (4) types of sampling used in geographical study.
[Bincangkan empat jenis persampelan yang digunakan dalam kajian geografi].

(25 marks/*markah*)

3. (a) Explain the use and the differences between correlation and regression in geography.
[Terangkan penggunaan dan perbezaan antara korelasi dan regresi dalam geografi].

(10 marks/*markah*)

(b) Based on data from Table 1, calculate a Pearson's correlation coefficient. Show every steps of your work.
[Berpandukan data dari Jadual 1, kira pekali korelasi Pearson's. Tunjukkan setiap langkah kerja anda].

(15 marks/*markah)*

Table 1: Relationship between variable X and variable Y.
Jadual 1: Hubungan antara pembolehubah X dan pembolehubah Y.

Variable X *[Pembolehubah X]*	80	61	23	94	87	37	64	22	23
Variable Y *[Pembolehubah Y]*	30	29	33	21	61	56	86	69	22

4. Answer the following questions using the following scenario:
“ An urban planner hypothesized that the average household size in a community is significantly higher than the statewide average, that is 2.23. A random sample of 81 household is surveyed and the average household size of the sample is 2.61. The standard deviation of the sample data, *s*, is 2.20”
[Jawab soalan-soalan berikut dengan menggunakan senario berikut:
"Seorang perancang bandar mengandaikan bahawa saiz isi rumah purata dalam masyarakat adalah lebih tinggi daripada purata di peringkat negeri iaitu 2.23. Satu sampel secara rawak daripada 81 isi rumah diambil dan saiz purata isi rumah sampel ialah 2.61. Sisihan piawai bagi data sampel, s, ialah 2.20 "

(a) Using a significant level of α = 0.05, test the hypothesis that the community’s mean household size does not differ from the statewide average.
[Dengan menggunakan tahap signifikan α = 0.05, uji hipotesis bahawa saiz isi rumah masyarakat tidak berbeza daripada purata peringkat negeri].

(10 marks/*markah*)

(b) State the null hypothesis, alternative hypothesis and critical value of the test statistics
[Nyatakan hipotesis nol, hipotesis alternatif dan nilai kritikal ujian statistik].

(10 marks/*markah*)

(c) What is the p-value for the test statistic?
[Apakah nilai-p untuk ujian statistik ini?]

(5 marks/*markah*)

5. Based on Table 2, answer the following questions:
[Berpandukan Jadual 2, jawab soalan-soalan berikut:]

Table 2: The number of residuals observed in a regression of paddy yields on precipitation and temperature over six locations.
[Jadual 2: Bilangan residual yang diamati dalam regresi hasil padi pada hujan dan suhu di enam lokasi].

Location *[Lokasi]*	1	2	3	4	5	6	
+	7	10	12	9	14	15	Number of positive residuals *[Bilangan residual yang positif]*
-	12	8	19	10	10	10	Number of negative residuals *[Bilangan residual yang negatif]*

(a) Calculate the chi-square statistic
[Kira statistik khi kuasa dua]

(10 marks/*markah*)

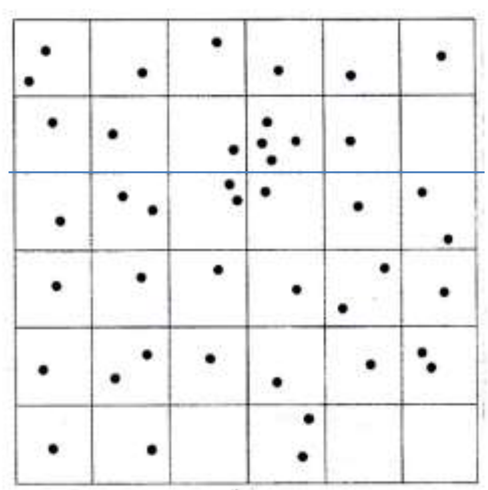
(b) Proof whether there is any interaction between location and the tendency of residuals to be positive or negative.
[Buktikan sama ada terdapat sebarang interaksi antara lokasi dan kecenderungan residual untuk menjadi positif atau negatif].

(15 marks/*markah*)

6. Based on Figure 1, explain every steps in using Quadrat Analysis of the data.
[Berpandukan Rajah 1, terangkan setiap langkah dalam menggunakan Analisis Quadrat untuk data tersebut].

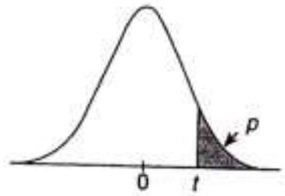
(25 marks/*markah*)

Figure 1: Crime locations in Urban A.
[Rajah 1: Lokasi Jenayah di Bandar A].



Appendix 1

TABLE 1: Student's *t* distribution
For various degrees of freedom (df), the tabled entries Represent the critical values of *t* above which a specified proportion p of the *t* distribution falls. (Example: for df=9, a *t* of 2.262 is surpassed by .025 or 2.5% of the total distribution).

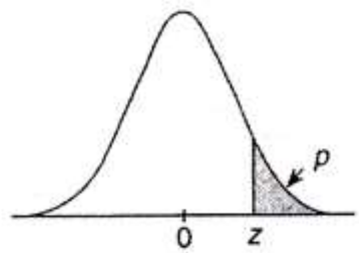


	p (one-tailed probabilities)				
df	**.10**	**.05**	**.025**	**.01**	**.005**
1	3.078	6.314	12.706	31.821	63.657
2	1.886	2.920	4.303	6.965	9.925
3	1.638	2.353	3.182	4.541	5.841
4	1.533	2.132	2.776	3.747	4.604
5	1.476	2.015	2.571	3.365	4.032
6	1.440	1.943	2.447	3.143	3.707
7	1.415	1.895	2.365	2.998	3.499
8	1.397	1.860	2.306	2.896	3.355
9	1.383	1.833	2.262	2.821	3.250
10	1.372	1.812	2.228	2.764	3.169
11	1.363	1.796	2.201	2.718	3.106
12	1.356	1.782	2.179	2.681	3.055
13	1.350	1.771	2.160	2.650	3.012
14	1.345	1.761	2.145	2.624	2.977
15	1.341	1.753	2.131	2.602	2.947
16	1.337	1.746	2.120	2.583	2.921
17	1.333	1.740	2.110	2.567	2.898
18	1.330	1.734	2.101	2.552	2.878
19	1.328	1.729	2.093	2.539	2.861
20	1.325	1.725	2.086	2.528	2.845
21	1.323	1.721	2.080	2.518	2.831
22	1.321	1.717	2.074	2.508	2.819
23	1.319	1.714	2.069	2.500	2.807
24	1.318	1.711	2.064	2.492	2.797
25	1.316	1.708	2.060	2.485	2.787
26	1.315	1.706	2.056	2.479	2.779
27	1.314	1.703	2.052	2.473	2.771
28	1.313	1.701	2.048	2.467	2.763
29	1.311	1.699	2.045	2.462	2.756
30	1.310	1.697	2.042	2.457	2.750
40	1.303	1.684	2.021	2.423	2.704
60	1.296	1.671	2.000	2.390	2.660
120	1.289	1.658	1.980	2.358	2.617
	1.282	1.645	1.960	2.326	2.576

Adapted from Table III of Fisher and Yates 1974.

Appendix 2

TABLE 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 vwlue 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).

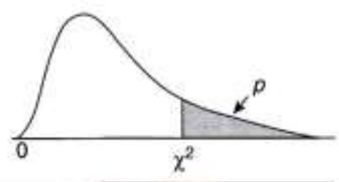


z	Second decimal place of z									
	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.5000	.4960	.4920	.4880	.4840	.4801	.4761	.4721	.4681	.4641
0.1	.4602	.4562	.4522	.4483	.4443	.4404	.4364	.4325	.4286	.4247
0.2	.4207	.4168	.4129	.4090	.4052	.4013	.3974	.3936	.3897	.3859
0.3	.3821	.3783	.3745	.3707	.3669	.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.

Appendix 3

TABLE 3 χ^2 distribution
For various degrees of freedom (df), the tabled entries represent the values of χ^2 above which a proportion *p* of the distribution falls. (Example: for df = 5, χ^2 = 11.070 is exceeded by *p* = .05% of the distribution).



df	.99	.95	.90	.10	.05	.01	.001
	p						
1	.0^{3}157	.00393	.0158	2.706	3.841	6.635	10.827
2	.0201	.103	.211	4.605	5.991	9.210	13.815
3	.115	.352	.584	6.251	7.815	11.345	16.266
4	.297	.711	1.064	7.779	9.488	13.277	18.467
5	.554	1.145	1.610	9.236	11.070	15.086	20.515
6	.872	1.635	2.204	10.645	12.592	16.812	22.457
7	1.239	2.167	2.833	12.017	14.067	18.475	24.322
8	1.646	2.733	3.490	13.362	15.507	20.090	26.125
9	2.088	3.325	4.168	14.684	16.919	21.666	27.877
10	2.558	3.940	4.865	15.987	18.307	23.209	29.588
11	3.053	4.575	5.578	17.275	19.675	24.725	31.264
12	3.571	5.226	6.304	18.549	21.026	26.217	32.909
13	4.107	5.892	7.042	19.812	22.362	27.688	34.528
14	4.660	6.571	7.790	21.064	23.685	29.141	36.123
15	5.229	7.261	8.547	22.307	24.996	30.578	37.697
16	5.812	7.962	9.312	23.542	26.296	32.000	39.252
17	6.408	8.672	10.085	24.769	27.587	33.409	40.790
18	7.015	9.390	10.865	25.989	28.869	34.805	42.312
19	7.633	10.117	11.651	27.204	30.144	36.191	43.820
20	8.260	10.851	12.443	28.412	31.410	37.566	45.315
21	8.897	11.591	13.240	29.615	32.671	38.932	46.797
22	9.542	12.338	14.041	30.813	33.924	40.289	48.268
23	10.196	13.091	14.848	32.007	35.172	41.638	49.728
24	10.856	13.848	15.659	33.196	36.415	42.980	51.179
25	11.524	14.611	16.473	34.382	37.652	44.314	52.620
26	12.198	15.379	17.292	35.563	38.885	45.642	54.052
27	12.879	16.151	18.114	36.741	40.113	46.963	55.476
28	13.565	16.928	18.939	37.916	41.337	48.278	56.893
29	14.256	17.708	19.768	39.087	42.557	49.588	58.302
30	14.953	18.493	20.599	40.256	43.773	50.892	59.703

Adapted from Table IV of Fisher and Yates 1974.

Formula:

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

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

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

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

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

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

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

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

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9. $y = a + bx$

10. $$r = \frac{\sum_{i-1}^{n}(x_i - \overline{x})(y_i - \overline{y})}{(n-1)s_x s_y}$$

11. $$s = \sqrt{\frac{\sum_{i=1}^{n}(x_1 - \overline{x})^2}{n-1}}$$

12. $$\chi_c^2 = \sum \frac{(O_i - E_i)^2}{E_i}$$

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