UNIVERSITI SAINS MALAYSIA

Final Examination
2015/2016 Academic Session

May/June 2016

JMG 317E – Quantitative Geography
[Geografi Kuantitatif]

Ducation : 3 hours
[Masa: 3 jam]

Please ensure that this examination paper contains **EIGHT** printed pages before you begin the examination.
*[Sila pastikan bahawa kertas peperiksaan ini mengandungi **LAPAN** 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.]

1. (a) What is the difference between correlation and regression?
[*Apakah perbezaan antara korelasi dan regresi?]*

(10 marks/*markah*)

(b) What is the difference between nominal data and ordinal data?
[Apakah perbezaan antara data nominal dan data ordinal?]

(10 marks/*markah*)

(c) What is skewness?
[Apa itu keserongan?]

(5 marks/*markah*)

2. Calculate mean and standard deviation of the following data set.
430, 441, 177, 133, 100, 426
[Kira min dan sisihan piawai bagi data berikut.]
[430, 441, 177, 133, 100, 426]

(25 marks/*markah*)

3. Table 1 shows data collected in an effort to determine whether rainfall is dependent upon elevation. Find Pearson correlation coefficient (r) using formula as follows:
[Jadual 1 menunjukkan data yang dikumpul untuk menentukan samada hujan bergantung kepada ketinggian. Kira pekali korelasi Pearson (r) dengan menggunakan formula seperti berikut:]

Formula:
[Formula:]

$$r_{xy} = \frac{1/n\sum(x-\bar{x})(y-\bar{y})}{s_x s_y}$$

Table 1: Rainfall and elevation data
[*Jadual 1 : Data hujan dan ketinggian]*

Rainfall (mm), y [*Hujan (mm), y]*	Elevation (m), x [*Ketinggian (m), x]*
45	675
11	200
36	400
78	800

(25 marks/*markah*)

4. (a) List the steps involved in hypothesis testing
[Senaraikan langkah-langkah dalam pengujian hipotesis]

(5 marks/*markah*)

(b) Test the null hypothesis that the two means are equal using the results of the pollutant level in two streams as follows:
[Uji hipotesis nul bagi dua min yang sama menggunakan keputusan tahap pencemaran di dua batang sungai seperti berikut:]

(15 marks/*markah*)

$\bar{x}_1$ = 25.1 mg/l ; $\bar{x}_2$ = 15.7 mg/l

s_1 = 14.0 mg/l ; s_2 = 12.2 mg/l

n_1 = 10; n_2 = 25

(c) Calculate the p-value.
[Kira nilai-p.]

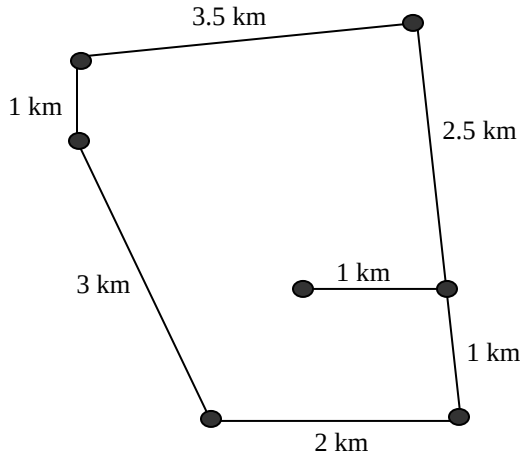
(5 marks/*markah*)

5. Fill in the ANOVA table below and compare the *F*-value with the critical value, using $\alpha = 0.05$
[Isi jadual ANOVA di bawah dan bandingkan nilai F dalam jadual dengan nilai kritikal menggunakan $\alpha = 0.05$]

	Sum of squares *[Jumlah kuasa dua]*	**df** *[df]*	**Mean square** *[Min kuasa dua]*	***F*** *[F]*
Between SS *[Antara SS]*	34.23	2	_____	_____
Within SS *[Dalam SS]*	_____	___	_____	
Total SS *[Jumlah SS]*	217.34	35	_____	

(25 marks/*markah*)

6. (a) Calculate the nearest neighbour statistic for the following pattern assuming a study area of 40 km^2:
[Kira statistik jiran kedekatan bagi corak berikut dengan keluasan kawasan bersamaan 40 km^2:]



(10 marks/*markah*)

(b) Test the null hypothesis that the pattern is random by calculating the z-statistic:
[Uji hipotesis nul yang mengatakan corak yang rambang dengan mengira statistik z:]

$$z = 1.913(R\text{-}1)\sqrt{n}.$$

(5 marks/*markah*)

(c) Calculate the Chi-Square statistic, $X^2 = (m-1)\sigma^2 / \bar{x}$ for a set of 81 quadrats, where 1/3 of the quadrats have 0 point, 1/3 of the quadrats have 1 point, and 1/3 of the quadrats have 2 points and calculate the z-value to test the hypothesis of randomness, using formula
[Kira statistik Chi-Kuasa dua, $X^2 = (m-1)\sigma^2 / \bar{x}$ *untuk satu set 81 kuadrat dimana 1/3 daripada kuadrat mempunyai 0 titik, 1/3 daripada kuadrat mempunyai 1 titik dan 1/3 daripada kuadrat mempunyai 2 titik dan kira nilai z untuk menguji hipotesis kerambangan menggunakan formula,]*

$$z = \frac{x^2 - (m-1)}{\sqrt{2(m-1)}},$$

(10 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

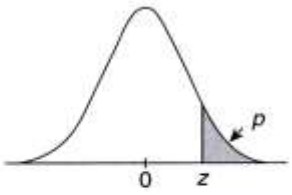
…7/-

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

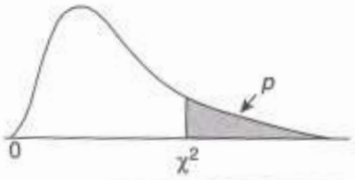
Adapted with rounding from Table II of Fisher and Yates 1974.

LAMPIRAN 3

Jadual χ^2

TABLE A.6 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 or 5% of the distribution.)



	p						
df	.99	.95	.90	.10	.05	.01	.001
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.