UNIVERSITI SAINS MALAYSIA

Final Examination
Academic Session 2007/2008

April 2008

JMG 317E – Quantitative Geography
[Geografi Kuantitatif]

Duration: 3 hours
[Masa: 3 jam]

Please ensure that this examination paper contains ELEVEN printed pages before you begin the examination.

Answer FOUR questions only. If you answer more than four questions, only the first four will be graded. You can answer either in Bahasa Malaysia or English.

Read the instructions carefully before answering.

Each question is worth 25 marks. Show your works, marks will be given for each work.

[Sila pastikan bahawa kertas peperiksaan ini mengandungi SEBELAS muka surat yang bercetak sebelum anda memulakan peperiksaan.

Jawab EMPAT (4) soalan. Jika calon menjawab lebih daripada empat soalan, hanya empat soalan pertama mengikut susunan dalam skrip jawapan akan diberi markah. Anda boleh menjawab sama ada dalam Bahasa Malaysia atau Bahasa English.

Baca arahan dengan teliti sebelum anda menjawab soalan.

Setiap soalan diperuntukkan 25 markah.]

1. Explain the meaning of FIVE (5) of the followings:

    (a) Skewness   (5 marks)

    (b) Normal distribution   (5 marks)

    (c) Interval data   (5 marks)

    (d) Frequency distribution   (5 marks)

    (e) Confidence interval   (5 marks)

    (f) Significance level   (5 marks)

    (g) Hypothesis testing   (5 marks)

2. Construct a frequency table and draw a histogram for the following dataset.

32	35	42	33	36	38	37	33	38	36	35	34	37	40	38	36	35	31	37	36	33
36	39	40	33	30	35	37	39	32	39	37	35	36	39	33	31	40	37	34	34	37

(25 marks)

3. In one class, half of the students are given coffee with caffeine and another half coffee without caffeine. The number of times each student yawns during the lecture is recorded with the following results. Answer the following questions.

With Caffeine	3	5	0	12	7	2	5	8
Without Caffeine	8	9	17	10	4	12	16	11

    (a) What is the problem statement of the above scenario?

                                                                 (5 marks)

    (b) State the null and alternative hypothesis.

                                                                 (5 marks)

    (c) Test the hypothesis and place a 95% confidence interval on the regression coefficient.

                                                                 (15 marks)

4. Find the mean, standard deviation and z-score of the following dataset, show your work.

    43, 6, 7, 122, 41, 21, 17, 1, 3

    (25 marks)

5. The following data are collected in an effort to determine whether rainfall (inches) is dependent on elevation (feet).

Rainfall (inches)	Elevation (feet)
36	400
78	800
11	200
45	675

    (a) Based on the above table, test the hypothesis that the regression coefficient associated with the independent variables is equal to zero. Place a 95% confidence interval on the regression coefficient.

    (25 marks)

6. (a) What is a quadrat analysis?

    (10 marks)

    (b) List down step by step procedures of quadrat analysis method.

    (15 marks)

MEASURE OF CENTRAL TENDENCY AND MEASURE OF VARIABILITY

Formulea

1. $\bar{X}, = \sum \dfrac{X}{N}$ or $\bar{X} = \sum \dfrac{fx}{N}$ or $\dfrac{1}{n} \sum fm$

2. $\hat{X} = L + \left(\dfrac{d_1}{d_1 + d_2} \right) c$ or $L + \dfrac{cd_1}{d_1 + d_2}$

3. $\tilde{X} \ \dfrac{N+1}{2}$ or $\hat{X} = L + \left(\dfrac{n}{2} - F \right) \dfrac{c}{f}$

4. No. of class $= K = 1 + 3.3 \ \log n$

5. Class Interval $= \dfrac{\text{range}}{K} + 1$

6. Range $= J = m_T - m_R$

7. Quartile $Q = \frac{1}{2} (Q_3 - Q_1)$ or $Q_1 = L + \left(\dfrac{n}{4} - F \right) \dfrac{c}{f}$ & $Q_3 = L + \left\{ \dfrac{n}{4}(3) - F \right\} \dfrac{c}{f}$

8. Mean deviation $= \dfrac{\left| \sum X_i \right|}{n}$ or $= \dfrac{1}{n} \sum \left| X_i - \bar{X} \right|$ or $\dfrac{1}{n} \sum_{i=1}^{k} f_i \left| X_i - \bar{X} \right|$

   or $\dfrac{1}{n} \sum f_i \left(\left| m_i - X \right| \right)$

9. Standard deviation $= \sqrt{\dfrac{\sum \left(X_i - \bar{X} \right)^2}{n-1}}$ or $\sqrt{\dfrac{\sum X^2 - \left[\left(\sum X \right)^2 / N \right]}{N-1}}$

10. t-test $= \dfrac{\bar{X} - \mu}{\sigma / \sqrt{n}}$

11. χ^2-test $= \sum \left(\dfrac{(O - E)^2}{E} \right)$ where $E_{ij} = \dfrac{O_i \times O_j}{N}$

12. t-table is attached.

13. χ^2 test table is attached.

[JMG 317E]

Jadual t

EXHIBIT G-2 Critical values of t for given probability levels

Level of significance for one-tailed test

| | .10 | .05 | .025 | .01 | .005 | .0005 |

Level of significance for two-tailed test

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						
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

The Chi Square Test

The critical values of chi square given below show the probability that he calculated value of x^2 is the result of a chance distribution. The *larger* the value of x^2 the *smaller* is the probability that H_0 is correct.

df	0.10	0.05	0.01	0.001
1	2.71	3.84	6.64	10.83
2	4.60	5.99	9.21	13.82
3	6.25	7.82	11.34	16.27
4	7.78	9.49	13.28	16.27
5	9.24	11.07	15.09	18.46
6	10.64	12.59	16.81	22.46
7	12.02	14.07	18.48	24.32
8	13.36	15.51	20.09	26.12
9	14.68	16.92	21.67	27.88
10	15.99	18.31	23.21	29.59
11	17.28	19.68	24.72	31.26
12	18.55	21.03	26.22	32.91
13	19.81	22.36	27.69	34.53
14	21.06	23.68	29.14	36.12
15	22.31	25.00	30.58	37.70
16	23.54	26.30	32.00	39.29
17	24.77	27.59	33.41	40.75
18	25.99	28.87	34.80	42.31
19	27.20	30.14	36.19	43.82
20	28.41	31.41	37.57	45.32
21	29.62	32.67	38.93	46.80
22	30.81	33.92	40.29	48.27
23	32.01	35.17	41.64	49.73
24	33.20	36.42	42.98	51.18
25	34.38	37.65	44.31	52.62
26	35.56	38.88	45.64	54.05
27	36.74	40.11	49.96	55.48
28	37.92	41.34	48.28	56.89
29	39.09	42.56	49.59	58.30
30	40.26	43.77	50.89	59.70

From Siegel(1956); after Fisher and Yates (1953).
Refer modul 4, page 58.

1.   Terangkan maksud LIMA (5) perkara di bawah:

    (a)   Skewness   (5 markah)

    (b)   Normal distribution   (5 markah)

    (c)   Interval data   (5 markah)

    (d)   Frequency distribution   (5 markah)

    (e)   Confidence interval   (5 markah)

    (f)   Significance level   (5 markah)

    (g)   Hypothesis testing   (5 markah)

2.   Bina satu jadual taburan dan lukiskan gambarajah histogram untuk data berikut.

32	35	42	33	36	38	37	33	38	36	35	34	37	40	38	36	35	31	37	36	33
36	39	40	33	30	35	37	39	32	39	37	35	36	39	33	31	40	37	34	34	37

(25 markah)

3.   Di dalam satu kelas, setengah daripada pelajar dalam kelas tersebut telah diberi minum kopi dengan kafein dan setengah pelajar lagi diberi minum kopi tanpa kafein. Bilangan kekerapan pelajar menguap semasa syarahan telah direkodkan. Berpandukan senario ini dan data di jadual berikut, jawab soalan seterusnya.

Dengan Kafein	3	5	0	12	7	2	5	8
Tanpa Kafein	8	9	17	10	4	12	16	11

    (a)   Apakah penyataan masalah bagi senario di atas?

                                                             (5 markah)

    (b)   Nyatakan hipotesis nul dan hipotesis alternatif.

                                                             (5 markah)

    (c)   Uji hipotesis dengan 95% aras keyakinan.

                                                           (15 markah)

4.   Kira purata, sisihan piawai dan ujian-z bagi set data berikut:

    | 43, 6, 7, 122, 41, 21, 17, 1, 3 |

                                                        (25 markah)

5.   Data berikut dikumpul untuk menentukan sama ada hujan (inci) bergantung kepada kecerunan (kaki).

Hujan (inci)	Kecerunan (kaki)
36	400
78	800
11	200
45	675

    (a)   Berpandukan jadual di atas, uji hipotesis pekali regresi yang dikaitkan dengan pembolehubah tidak bersandar bersamaan dengan kosong. Guna 95% aras keertian.

                                                        (25 markah)

6.   (a)   Apa itu 'quadrat analysis'?

                                                        (10 markah)

    (b)   Senaraikan langkah-langkah dalam menjalankan kaedah 'quadrat analysis'.

                                                        (15 markah)

SUKATAN KECENDERUNGAN MEMUSAT & SUKATAN SEBARAN

Formula

1. Rumus $\overline{X}$, sama ada $= \sum \dfrac{X}{N}$ atau $\overline{X} = \sum \dfrac{fx}{N}$ atau $\dfrac{1}{n} \sum fm$

2. Rumus $\hat{X}$ ialah $\hat{X} = L + \left(\dfrac{d_1}{d_1 + d_2} \right) c$ atau $L + \dfrac{cd_1}{d_1 + d_2}$

3. Rumus $\tilde{X}$ sama ada data ke $\dfrac{N+1}{2}$ atau $\hat{X} = L + \left(\dfrac{n}{2} - F \right) \dfrac{c}{f}$

4. Rumus untuk Jumlah Kelas $= K = 1 + 3.3 \ \log n$

5. Rumus Selang Kelas $= \dfrac{\text{Julat}}{K} + 1$

6. Rumus Julat $= J = m_T - m_R$

7. Rumus Sisihan Kuartil, sama ada $Q = \frac{1}{2}(Q_3 - Q_1)$ atau

$$Q_1 = L + \left(\dfrac{n}{4} - F \right) \dfrac{c}{f} \quad \& \quad Q_3 = L + \left\{ \dfrac{n}{4}(3) - F \right\} \dfrac{c}{f}$$

8. Rumus Sisihan Purata sama ada $= \dfrac{\left| \sum X_i \right|}{n}$ atau $= \dfrac{1}{n} \sum \left| X_i - \overline{X} \right|$ atau $\dfrac{1}{n} \sum_{i=1}^{k} f_i \left| X_i - \overline{X} \right|$

atau $\dfrac{1}{n} \sum f_i \left(\left| m_i - X \right| \right)$

9. Rumus Sisihan Piawai sama ada $= \sqrt{\dfrac{\sum (X_i - \overline{X})^2}{n-1}}$ atau $\sqrt{\dfrac{\sum X^2 - \left[(\sum X)^2 / N \right]}{N-1}}$

10. Ujian $t = \dfrac{\overline{X} - \mu}{\sigma / \sqrt{n}}$

11. Rumus Ujian Khi Kuasa Dua $(x^2) = \sum \left(\dfrac{(O - E)^2}{E} \right)$ di mana $E_{ij} = \dfrac{O_i \times O_j}{N}$

12. Jadual t dilampirkan

13. Jadual Ujian Khi-Kuasa Dua dilampirkan.

Jadual t

EXHIBIT G-2 Nilai kritikal t untuk level 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
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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

Jadual bagi Ujian Khi-Kuasa Dua

The Chi Square Test

The critical values of chi square given below show the probability that he calculated value of x^2 is the result of a chance distribution. The *larger* the value of x^2 the *smaller* is the probability that H_0 is correct.

df	0.10	0.05	0.01	0.001
1	2.71	3.84	6.64	10.83
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3	6.25	7.82	11.34	16.27
4	7.78	9.49	13.28	16.27
5	9.24	11.07	15.09	18.46
6	10.64	12.59	16.81	22.46
7	12.02	14.07	18.48	24.32
8	13.36	15.51	20.09	26.12
9	14.68	16.92	21.67	27.88
10	15.99	18.31	23.21	29.59
11	17.28	19.68	24.72	31.26
12	18.55	21.03	26.22	32.91
13	19.81	22.36	27.69	34.53
14	21.06	23.68	29.14	36.12
15	22.31	25.00	30.58	37.70
16	23.54	26.30	32.00	39.29
17	24.77	27.59	33.41	40.75
18	25.99	28.87	34.80	42.31
19	27.20	30.14	36.19	43.82
20	28.41	31.41	37.57	45.32
21	29.62	32.67	38.93	46.80
22	30.81	33.92	40.29	48.27
23	32.01	35.17	41.64	49.73
24	33.20	36.42	42.98	51.18
25	34.38	37.65	44.31	52.62
26	35.56	38.88	45.64	54.05
27	36.74	40.11	49.96	55.48
28	37.92	41.34	48.28	56.89
29	39.09	42.56	49.59	58.30
30	40.26	43.77	50.89	59.70

From Siegel(1956); after Fisher and Yates (1953).
Rujuk Modul 4, ms 58

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