UNIVERSITI SAINS MALAYSIA

First Semester Examination
Academic Session 2006/20067

October/November 2006

HGT 513 – RESEARCH METHODS AND GEOGRAPHIC DATABASE MANAGEMENT

Duration : 3 hours

Please check that this paper consists of SEVEN pages of printed material before you begin the examination.

Answer FOUR questions. Answer TWO questions from Section A and TWO questions from Section B.

Section A

Answer TWO questions.

1. Using relevant example, discuss the considerations to be made in preparing a research proposal.

    [25 marks]

2. Using relevant example, discuss the procedures in preparing a research project on Geographic Information System in solving site selection problem.

    [25 marks]

3. Table 1 shows the percentage of Parkinson's disease as the cause of death between male and female, 1993 to 2004. Using t-test, determine whether Male and Female experienced significantly different effect of Parkinson's disease as the cause of death. At a significant level of 5%:

    [a] Conduct two tailed test.   [15 marks]

    [b] Conduct one tailed test.   [10 marks]

    Table 1: Percentage of Parkinson's disease as the cause of death between male and female, 1993 – 2004.

Year	Male	Female
1993	35	34
1994	36	35
1995	33	30
1996	35	31
1997	35	32
1998	36	38
1999	36	37
2000	36	40
2001	53	50
2002	55	56
2003	57	52
2004	55	50

4. Table 2 shows crime index rate and poverty level for selected states in the United States.

[a] At $\propto$ = 0.05, determine whether the poverty level is correlated with crime index rate.

[20 marks]

[b] Describe the method that can be used to predict the crime index rate for other states if the percentage of poverty is known.

[5 marks]

Table 2: Crime index rate and poverty level for selected states in the United States.

	Crime Index Rate (number of crime per 100,000 population)	Poverty Level
Texas	4955.5	16.3%
Louisiana	5422.8	20.3%
Mississippi	4004.4	19.9%
Alabama	4545.9	17.1%
Florida	5694.7	13.1%
South Carolina	5221.5	18.7%

Section B

Answer TWO questions.

5. Using one selected application, construct a complete design of a geographic database based on geodatabase model.

[25 marks]

6. [a] Describe the three key facets of object data model.

[10 marks]

[b] Explain with geographic examples why object data model is superior than feature-based data model in designing GIS database.

[15 marks]

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7. [a] Describe the important factors in the evaluation of geographic data sources.

[10 marks]

[b] A database is an integrated set of data on a particular subject. Discuss.

[15 marks]

8. Discuss the advantages of relational database model over other conventional models in the context of GIS database design.

[25 marks]

Statistical Formula

T-test, when variances are uniform.

$$t = \frac{\overline{x}_A - \overline{x}_B}{\sqrt{\dfrac{(n_A-1)\,s_A^2 - (n_B-1)\,s_B^2}{n_A+n_B-2}\left(\dfrac{1}{n_A}+\dfrac{1}{n_B}\right)}}$$

T-test, when variances are different.

$$t = \frac{\overline{x}_A - \overline{x}_B}{\sqrt{\dfrac{s_A^2}{n_A}+\dfrac{s_B^2}{n_B}}}$$

$$r = \frac{\sum XY - \dfrac{\left(\sum x\right)\left(\sum y\right)}{n}}{\sqrt{\left(\sum x^2 - \dfrac{\left(\sum x^2\right)}{n}\right)\left(\sum y^2 - \dfrac{\left(\sum y^2\right)}{n}\right)}}$$

Student's *t*-Distribution Critical Values

df	0.5	0.40	0.30	0.20	0.10	0.05	0.04	0.02	0.01	0.005	0.002	0.001
1	1.000	1.376	1.963	3.078	6.314	12.71	15.89	31.82	63.66	127.3	318.3	636.6
2	.816	1.061	1.386	1.886	2.920	4.303	4.849	6.965	9.925	14.09	22.33	31.60
3	.765	.978	1.250	1.638	2.353	3.182	3.482	4.541	5.841	7.453	10.21	12.92
4	.741	.941	1.190	1.533	2.132	2.776	2.999	3.747	4.604	5.598	7.173	8.610
5	.727	.920	1.156	1.476	2.015	2.571	2.757	3.365	4.032	4.773	5.893	6.869
6	.718	.906	1.134	1.440	1.943	2.447	2.612	3.143	3.707	4.317	5.208	5.959
7	.711	.896	1.119	1.415	1.895	2.365	2.517	2.998	3.499	4.029	4.785	5.408
8	.706	.889	1.108	1.397	1.860	2.306	2.449	2.896	3.355	3.833	4.501	5.041
9	.703	.883	1.100	1.383	1.833	2.262	2.398	2.821	3.250	3.690	4.297	4.781
10	.700	.879	1.093	1.372	1.812	2.228	2.359	2.764	3.169	3.581	4.144	4.587
11	.697	.876	1.088	1.363	1.796	2.201	2.328	2.718	3.106	3.497	4.025	4.437
12	.695	.873	1.083	1.356	1.782	2.179	2.303	2.681	3.055	3.428	3.930	4.318
13	.694	.870	1.079	1.350	1.771	2.160	2.282	2.650	3.012	3.372	3.852	4.221
14	.692	.868	1.076	1.345	1.761	2.145	2.264	2.624	2.977	3.326	3.787	4.140
15	.691	.866	1.074	1.341	1.753	2.131	2.249	2.602	2.947	3.286	3.733	4.073
16	.690	.865	1.071	1.337	1.746	2.120	2.235	2.583	2.921	3.252	3.686	4.015
17	.689	.863	1.069	1.333	1.740	2.110	2.224	2.567	2.898	3.222	3.646	3.965
18	.688	.862	1.067	1.330	1.734	2.101	2.214	2.552	2.878	3.197	3.611	3.922
19	.688	.861	1.066	1.328	1.729	2.093	2.205	2.539	2.861	3.174	3.579	3.883
20	.687	.860	1.064	1.325	1.725	2.086	2.197	2.528	2.845	3.153	3.552	3.850
21	.663.	.859	1.063	1.323	1.721	2.080	2.189	2.518	2.831	3.135	3.527	3.819
22	.686	.858	1.061	1.321	1.717	2.074	2.183	2.508	2.819	3.119	3.505	3.792
23	.685	.858	1.060	1.319	1.714	2.069	2.177	2.500	2.807	3.104	3.485	3.768
24	.685	.857	1.059	1.318	1.711	2.064	2.172	2.492	2.797	3.091	3.467	3.745
25	.684	.856	1.058	1.316	1.708	2.060	2.167	2.485	2.787	3.078	3.450	3.725
26	.684	.856	1.058	1.315	1.706	2.056	2.162	2.479	2.779	3.067	3.435	3.707
27	.684	.855	1.057	1.314	1.703	2.052	2.15	2.473	2.771	3.057	3.421	3.690
28	.683	.855	1.056	1.313	1.701	2.048	2.154	2.467	2.763	3.047	3.408	3.674
29	.683	.854	1.055	1.311	1.699	2.045	2.150	2.462	2.756	3.038	3.396	3.659
30	.683	.854	1.055	1.310	1.697	2.042	2.147	2.457	2.750	3.030	3.385	3.646
40	.681	.851	1.050	1.303	1.684	2.021	2.123	2.423	2.704	2.971	3.307	3.551
50	.679	.849	1.047	1.295	1.676	2.009	2.109	2.403	2.678	2.937	3.261	3.496
60	.679	.848	1.045	1.296	1.671	2.000	2.099	2.390	2.660	2.915	3.232	3.460
80	.678	.846	1.043	1.292	1.664	1.990	2.088	2.374	2.639	2.887	3.195	3.416
100	.677	.845	1.042	1.290	1.660	1.984	2.081	2.364	2.626	2.871	3.174	3.390
1000	.675	.842	1.037	1.282	1.646	1.962	2.056	2.330	2.581	2.813	3.098	3.300
inf.	.674	.841	1.036	1.282	1.645	1.960	2.054	2.326	2.576	2.807	3.091	3.291

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UNIVERSITI SAINS MALAYSIA

Peperiksaan Semester Pertama
Sidang Akademik 2006/2007

Oktober/November 2006

**HGT 513 – KAEDAH PENYELIDIKAN DAN PENGURUSAN
PANGKALAN DATA GEOGRAFI**

Masa : 3 jam

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

Jawap EMPAT soalan. Jawab DUA soalan di Bahagian A dan DUA soalan di
Bahagian B.

Bahagian A

Jawab DUA soalan.

1. Merujuk kepada contoh-contoh yang relevan, bicangkan pertimbangan yang perlu diberikan dalam penyediaan cadangan penyelidikan.

[25 markah]

2. Menggunakan contoh yang relevan, bincangkan prosedur dalam penyediaan projek penyelidikan melibatkan Sistem Maklumat Geografi dalam penyelesaian masalah pemilihan tapak.

[25 markah]

3. Jadual 1 menunjukkan peratusan penyakit Parkinson sebagai punca kematian bagi lelaki dan wanita, 1993 hingga 2004. Menggunakan Ujian t, tentukan sama ada terdapat perbezaan yang signifikan antara lelaki dan wanita yang mengalami kematian kerana penyakit Parkinson. Pada paras keertian 5%.

[a] Buat ujian dua hujung [15 markah]

[b] Buat ujian satu hujung. [10 markah]

Jadual 1: Peratusan penyakit Parkinson sebagai punca kamatian antara lelaki dan wanita, 1993 – 2004.

Tahun	Lelaki	Wanita
1993	35	34
1994	36	35
1995	33	30
1996	35	31
1997	35	32
1998	36	38
1999	36	37
2000	36	40
2001	53	50
2002	55	56
2003	57	52
2004	55	50

4. Jadual 2 menunjukkan indek kadar jenayah dan tahap kemiskinan di beberapa negeri terpilih di Amerika Syarikat.

   [a] Pada $\propto$ = 0.05, tentukan sama ada terdapat korelasi antara kadar kemiskinan dan kadar indeks jenayah.

   [20 markah]

   [b] Jelaskan kaedah lain yang sesuai digunakan dalam meramal kadar indeks jenayah sesuatu kawasan jika kadar kemiskinan diketahui.

   [5 markah]

Jadual 2: Indek kadar jenayah dan kadar kemiskinan negeri-negeri terpilih di Amerika Syarikat.

Negeri	Indek Kadar Jenayah (jumlah jenayah bagi 100,000 penduduk)	Kadar Kemiskinan
Texas	4955.5	16.3%
Louisiana	5422.8	20.3%
Mississippi	4004.4	19.9%
Alabama	4545.9	17.1%
Florida	5694.7	13.1%
South Carolina	5221.5	18.7%

Bahagian B.

Jawab DUA soalan.

5. Menggunakan satu aplikasi terpilih, bina reka bentuk lengkap pangkalan data geografi berasaskan kepada model geodatabase.

   [25 markah]

6. [a] Huraikan tiga sifat utama model data objek.

   [10 markah]

   [b] Huraikan dengan contoh geografi kenapa model data objek lebih baik daripada model data berasaskan fitur dalam mereka bentuk pangkalan data sistem maklumat geografi.

   [15 markah]

7. [a] Huraikan faktor-faktor penting dalam menilai sumber data geografi.

[10 markah]

[b] Pangkalan data ialah satu set data bersepadu mengenai sesuatu subjek. Bincangkan.

[15 markah].

8. Bincangkan kelebihan-kelebihan model pangkalan data relational berbanding model-model konvensional lain dalam konteks reka bentuk pangkalan data sistem maklumat geografi.

[25 markah]

Statistical Formula

T-test, when variances are uniform.

$$t = \frac{\overline{x}_A - \overline{x}_B}{\sqrt{\frac{(n_A - 1)s_A^2 - (n_B - 1)s_B^2}{n_A + n_B - 2}\left(\frac{1}{n_A} + \frac{1}{n_B}\right)}}$$

T-test, when variances are different.

$$t = \frac{\overline{x}_A - \overline{x}_B}{\sqrt{\frac{s_A^2}{n_A} + \frac{s_B^2}{n_B}}}$$

$$r = \frac{\sum XY - \frac{(\sum x)(\sum y)}{n}}{\sqrt{\left(\sum x^2 - \frac{(\sum x^2)}{n}\right)\left(\sum y^2 - \frac{(\sum y^2)}{n}\right)}}$$

Student's *t*-Distribution critical values

df	0.5	0.40	0.30	0.20	0.10	0.05	0.04	0.02	0.01	0.005	0.002	0.001
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2	.816	1.061	1.386	1.886	2.920	4.303	4.849	6.965	9.925	14.09	22.33	31.60
3	.765	.978	1.250	1.638	2.353	3.182	3.482	4.541	5.841	7.453	10.21	12.92
4	.741	.941	1.190	1.533	2.132	2.776	2.999	3.747	4.604	5.598	7.173	8.610
5	.727	.920	1.156	1.476	2.015	2.571	2.757	3.365	4.032	4.773	5.893	6.869
6	.718	.906	1.134	1.440	1.943	2.447	2.612	3.143	3.707	4.317	5.208	5.959
7	.711	.896	1.119	1.415	1.895	2.365	2.517	2.998	3.499	4.029	4.785	5.408
8	.706	.889	1.108	1.397	1.860	2.306	2.449	2.896	3.355	3.833	4.501	5.041
9	.703	.883	1.100	1.383	1.833	2.262	2.398	2.821	3.250	3.690	4.297	4.781
10	.700	.879	1.093	1.372	1.812	2.228	2.359	2.764	3.169	3.581	4.144	4.587
11	.697	.876	1.088	1.363	1.796	2.201	2.328	2.718	3.106	3.497	4.025	4.437
12	.695	.873	1.083	1.356	1.782	2.179	2.303	2.681	3.055	3.428	3.930	4.318
13	.694	.870	1.079	1.350	1.771	2.160	2.282	2.650	3.012	3.372	3.852	4.221
14	.692	.868	1.076	1.345	1.761	2.145	2.264	2.624	2.977	3.326	3.787	4.140
15	.691	.866	1.074	1.341	1.753	2.131	2.249	2.602	2.947	3.286	3.733	4.073
16	.690	.865	1.071	1.337	1.746	2.120	2.235	2.583	2.921	3.252	3.686	4.015
17	.689	.863	1.069	1.333	1.740	2.110	2.224	2.567	2.898	3.222	3.646	3.965
18	.688	.862	1.067	1.330	1.734	2.101	2.214	2.552	2.878	3.197	3.611	3.922
19	.688	.861	1.066	1.328	1.729	2.093	2.205	2.539	2.861	3.174	3.579	3.883
20	.687	.860	1.064	1.325	1.725	2.086	2.197	2.528	2.845	3.153	3.552	3.850
21	.663.	.859	1.063	1.323	1.721	2.080	2.189	2.518	2.831	3.135	3.527	3.819
22	.686	.858	1.061	1.321	1.717	2.074	2.183	2.508	2.819	3.119	3.505	3.792
23	.685	.858	1.060	1.319	1.714	2.069	2.177	2.500	2.807	3.104	3.485	3.768
24	.685	.857	1.059	1.318	1.711	2.064	2.172	2.492	2.797	3.091	3.467	3.745
25	.684	.856	1.058	1.316	1.708	2.060	2.167	2.485	2.787	3.078	3.450	3.725
26	.684	.856	1.058	1.315	1.706	2.056	2.162	2.479	2.779	3.067	3.435	3.707
27	.684	.855	1.057	1.314	1.703	2.052	2.15	2.473	2.771	3.057	3.421	3.690
28	.683	.855	1.056	1.313	1.701	2.048	2.154	2.467	2.763	3.047	3.408	3.674
29	.683	.854	1.055	1.311	1.699	2.045	2.150	2.462	2.756	3.038	3.396	3.659
30	.683	.854	1.055	1.310	1.697	2.042	2.147	2.457	2.750	3.030	3.385	3.646
40	.681	.851	1.050	1.303	1.684	2.021	2.123	2.423	2.704	2.971	3.307	3.551
50	.679	.849	1.047	1.295	1.676	2.009	2.109	2.403	2.678	2.937	3.261	3.496
60	.679	.848	1.045	1.296	1.671	2.000	2.099	2.390	2.660	2.915	3.232	3.460
80	.678	.846	1.043	1.292	1.664	1.990	2.088	2.374	2.639	2.887	3.195	3.416
100	.677	.845	1.042	1.290	1.660	1.984	2.081	2.364	2.626	2.871	3.174	3.390
1000	.675	.842	1.037	1.282	1.646	1.962	2.056	2.330	2.581	2.813	3.098	3.300
inf.	.674	.841	1.036	1.282	1.645	1.960	2.054	2.326	2.576	2.807	3.091	3.291

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