

國立交通大學 105 學年度第 2 學期

博士班資格考筆試考試試題

土木工程學系 測量組(戊) 科目：專業科目(地理資訊系統) 選考學生數：1 考試時間：120min closed book

共 1 頁，第 1 頁

- 1. Map generalization is a method for deriving a smaller-scale map from a larger-scale map. Please use an example to explain the concept of **Douglas–Peucker algorithm** in line simplification. (20%)
- 2. Please use an example to explain the concept of **Dijkstra’s algorithm** in shortest path analysis. (20%)
- 3. What are the differences between ‘**Georelational data model**’ and ‘**Object-based data model**’ for vector data model? (20%)
- 4. The following table shows the average PM2.5 per hour from Airbox (空氣盒子) project on April 30, 2017. Please answer the following questions:
  - a. In order to ensure the data quality, please provide a **procedure to detect the outliers**. (20%)
  - b. Please provide **two spatial interpolation methods** to generate raster data (i.e. grid data) from this table. (20%)

site_id	gps_lon (degree)	gps_lat (degree)	Average PM2.5 (µg/m3) per hour																							
			00:00	01:00	02:00	03:00	04:00	05:00	06:00	07:00	08:00	09:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
28C2DDDD415C	120.7550	23.7410	39.90	41.66	42.69	44.19	43.83	41.24	41.18	39.74	41.00	42.93	41.95	42.24	43.27	43.95	45.25	43.97	42.15	40.54	38.96	38.01	38.06	38.03	38.86	37.65
28C2DDDD4575	121.4510	25.0620	36.07	37.61	38.84	39.50	41.52	38.64	37.42	38.07	38.48	39.79	38.32	37.77	37.78	38.30	39.74	38.74	38.13	36.96	36.10	35.63	35.62	36.54	35.09	35.01
28C2DDDD423A	121.4980	25.0260	31.17	31.74	34.91	38.09	36.57	35.29	31.76	29.52	30.50	28.35	27.85	29.65	27.22	26.86	24.88	25.40	24.75	24.70	24.44	23.20	27.33	27.87	27.24	27.40
28C2DDDD4534	121.5070	25.0840	26.12	27.03	28.37	30.29	29.89	31.02	31.68	31.40	30.76	29.13	28.25	28.05	27.44	27.32	27.31	27.49	27.08	27.63	26.64	26.52	26.22	25.68	25.81	25.70
28C2DDDD4377	121.4920	25.0330	32.51	32.88	36.90	36.90	34.00	31.66	31.51	31.21	31.20	35.69	34.04	34.91	33.78	35.34	39.33	40.32	37.82	33.17	33.29	30.84	32.30	30.27	30.54	31.26
28C2DDDD4539	121.5360	25.1100	28.93	28.15	30.30	27.64	27.55	26.22	26.67	26.08	27.42	27.75	27.81	27.33	25.95	26.07	25.94	25.66	25.17	25.52	26.08	26.07	26.13	25.46	25.85	27.82
28C2DDDD4414	121.6190	25.0400	37.78	36.59	37.58	36.55	38.02	36.44	36.24	36.34	35.75	38.20	36.82	37.21	36.28	36.55	36.09	36.13	36.50	35.77	35.26	35.25	35.46	34.79	35.32	37.20
28C2DDDD4394	121.5700	25.0470	29.90	30.97	32.31	33.65	33.54	32.34	33.44	33.81	34.42	33.53	30.68	29.16	28.19	27.97	27.51	27.33	26.64	26.30	25.77	25.34	24.72	24.19	24.03	25.01
28C2DDDD435A	121.5590	24.9990	32.14	33.33	33.63	33.04	34.71	32.85	33.42	33.95	34.20	34.64	34.37	31.97	32.79	33.37	32.13	34.94	33.04	31.65	32.86	32.34	29.35	30.56	30.86	30.89
28C2DDDD452E	121.5480	25.0380	39.23	40.40	41.34	42.00	41.71	39.13	39.94	39.32	39.13	40.74	42.04	42.34	43.39	43.29	45.37	44.49	156.52	41.77	40.03	39.83	38.90	39.06	38.91	38.52
28C2DDDD47A4	121.5570	24.9890	35.64	35.91	37.08	36.67	37.93	37.41	37.35	38.03	36.29	36.90	35.61	35.57	35.92	36.55	36.54	35.80	34.78	35.39	33.89	33.20	32.97	33.10	33.65	34.85
28C2DDDD455E	121.4990	25.0230	34.51	35.35	38.42	38.18	37.77	34.16	34.81	34.41	34.76	35.34	35.80	36.32	36.12	38.58	40.21	40.05	37.42	35.16	34.27	33.28	33.97	32.77	32.97	33.82
28C2DDDD459A	121.5300	25.0980	36.16	38.36	40.12	36.76	34.13	34.30	34.91	34.56	35.07	34.68	35.47	36.43	34.58	34.89	35.03	34.34	33.44	32.82	32.88	34.05	33.87	33.90	34.17	36.13
28C2DDDD4566	121.5850	25.0380	39.06	38.58	39.48	39.61	40.16	38.53	38.36	37.99	36.49	38.44	36.73	36.66	37.53	37.54	38.46	38.78	38.83	38.23	38.10	37.82	37.62	37.91	38.35	38.92
28C2DDDD459F	121.5030	25.0890	38.07	38.58	38.77	36.82	33.77	33.31	32.11	31.52	32.61	31.99	32.73	32.16	32.17	33.43	34.15	34.29	33.98	33.26	33.37	34.71	35.01	34.51	35.29	37.30
28C2DDDD4229	121.5120	25.1150	34.99	35.03	34.88	33.25	31.30	31.56	32.05	31.45	31.73	32.45	32.43	31.28	32.18	33.86	32.24	32.52	32.90	33.08	33.37	33.07	32.69	32.75	33.17	34.58
28C2DDDD4372	121.5900	25.0610	40.60	39.86	39.49	38.14	37.82	36.69	36.97	37.00	36.21	38.36	38.71	38.89	39.68	40.88	42.05	41.44	40.99	40.12	40.49	39.92	39.30	39.10	39.49	40.89
28C2DDDD4246	121.5070	25.1260	37.75	36.59	39.18	36.13	34.37	34.95	34.91	33.99	32.86	33.31	32.76	32.80	32.00	32.04	31.99	31.50	31.87	31.40	31.23	31.52	31.32	30.07	31.13	34.54
28C2DDDD41FA	121.5520	25.0560	36.89	37.56	37.78	39.33	38.16	36.12	38.03	37.04	36.65	36.87	37.63	37.31	37.66	38.28	40.20	40.15	40.28	39.41	37.90	36.73	36.52	35.36	36.06	35.90
28C2DDDD4233	121.5200	25.0400	32.44	33.89	35.60	39.53	37.38	34.92	36.40	36.27	33.95	33.37	33.50	33.23	33.84	35.00	36.14	36.76	35.06	33.21	32.50	31.65	31.17	30.59	30.71	29.93
28C2DDDD458A	121.5220	25.1120	37.53	37.45	41.33	37.30	35.93	36.06	36.99	35.84	35.29	34.74	35.17	36.58	36.60	36.02	35.45	36.78	36.04	34.84	36.09	35.08	34.36	34.90	34.54	36.59
28C2DDDD4239	121.4960	25.1340	38.03	40.66	42.37	38.90	35.33	35.23	34.79	33.34	33.83	32.25	33.49	34.23	32.62	33.39	32.45	32.86	33.52	33.19	31.89	33.34	35.59	33.24	34.11	35.83
28C2DDDD400A	121.5480	25.0490	34.12	35.49	38.30	37.35	36.83	33.95	35.23	34.08	34.79	34.31	35.06	35.04	35.99	36.65	38.35	39.46	39.54	36.81	35.51	34.78	33.92	33.71	33.62	33.84
28C2DDDD434F	121.5410	25.0450	26.76	27.26	27.27	25.89	27.25	27.15	29.02	32.19	31.40	29.71	31.72	30.48	29.63	29.39	28.84	28.73	29.01	28.35	28.27	27.28	25.65	25.03	24.40	24.57
28C2DDDD4373	121.5760	25.1280	23.11	19.75	24.56	27.20	28.34	28.68	36.11	38.86	36.44	43.20	40.43	41.48	41.69	42.00	34.23	32.80	29.99	28.67	30.72	31.05	31.35	30.18	30.37	26.91
28C2DDDD45A1	121.4820	25.1050	41.25	40.00	41.13	37.33	34.94	34.48	34.34	33.74	35.15	35.98	37.06	39.22	38.05	40.44	43.98	42.72	42.42	42.51	41.86	40.83	41.94	41.65	43.64	42.13
28C2DDDD4599	121.4930	25.0310	23.47	23.18	26.42	25.47	23.74	23.36	25.25	24.49	25.39	25.16	24.95	27.91	31.27	31.65	29.99	27.95	24.96	23.86	23.92	22.91	23.10	22.31	22.25	23.82
28C2DDDD434D	121.5160	25.0640	36.49	36.61	38.59	38.09	37.89	37.11	37.34	36.54	36.18	38.51	36.93	39.45	39.92	41.29	41.19	40.77	41.01	40.37	41.10	41.43	39.71	39.59	40.89	42.17
28C2DDDD41B2	121.5360	25.0730	32.41	33.70	34.43	33.14	30.71	29.63	31.19	30.51	31.09	30.46	30.02	30.28	29.97	31.74	32.44	32.68	32.97	33.71	34.20	32.94	32.23	31.54	32.40	32.13
28C2DDDD458F	121.5320	25.0360	30.19	31.59	34.39	32.54	31.88	30.34	31.00	30.61	30.74	30.30	30.97	31.84	31.09	32.28	34.07	33.87	34.00	32.86	31.23	30.48	29.94	30.31	29.14	30.11
28C2DDDD4579	121.5710	25.0350	33.97	34.15	34.22	30.85	33.31	31.22	33.12	38.96	39.61	40.60	38.55	38.23	38.40	39.20	43.66	43.50	40.76	39.21	37.11	36.54	36.57	35.95	33.36	34.60
28C2DDDD434D	121.6110	25.0670	42.06	39.39	39.71	38.79	37.89	37.11	37.34	36.54	36.18	38.51	36.93	39.45	39.92	41.29	41.19	40.77	41.01	40.37	41.10	41.43	39.71	39.59	40.89	42.17
28C2DDDD4367	121.6090	25.0560	23.91	23.50	24.10	24.00	24.25	22.93	21.50	21.55	20.41	17.50	18.75	20.70	21.16	28.16	25.15	37.32	36.24	24.11	28.48	26.25	26.43	25.42	27.74	33.83
28C2DDDD4360	121.5220	25.0800	41.04	41.19	42.60	41.09	38.16	38.06	37.84	36.92	37.77	37.90	38.42	39.21	38.84	39.75	41.48	42.11	41.53	41.21	41.17	40.26	39.95	38.83	39.73	39.34
28C2DDDD4378	121.5620	25.0560	32.64	33.16	32.52	32.61	31.60	31.66	32.61	32.35	31.44	31.58	30.76	28.69	28.14	28.40	28.62	28.40	28.09	27.88	28.18	27.83	28.02	27.67	28.95	30.96
28C2DDDD43FC	121.5630	25.0310	24.13	23.60	24.12	24.78	24.80	23.24	23.23	23.09	23.86	23.52	23.24	24.00	23.72	23.77	25.33	25.64	24.60	23.68	20.97	21.90	21.58	21.27	21.82	22.22
28C2DDDD456A	121.5510	25.0350	32.88	33.05	34.15	34.85	34.64	32.66	33.14	32.77	32.01	33.16	33.33	36.47	36.73	36.31	37.30	38.35	35.94	34.28	33.46	32.99	32.89	32.60	32.97	32.42
28C2DDDD45AA	121.4510	25.0620	40.27	40.13	41.44	37.42	37.73	36.85	35.14	33.83	34.02	33.88	34.60	36.48	36.11	37.00	36.31	37.29	38.78	38.96	38.83	38.47	38.46	38.15	38.60	39.34