Problem 1(a) (i)

	TYO	DEL	SHA	BJ	MUM	OSA	DHK	CCU	SEL	9x9 matrix
TYO	0	5847	1767	2099	6740	403	4894	5138	1156	
DEL	5847	0	4243	3777	1163	5476	1425	1304	4686	
SHA	1767	4243	0	1070	5039	1364	3161	3403	871	
BJ	2099	3777	1070	0	4756	1777	3026	3266	956	
MUM	6740	1163	5039	4756	0	6355	1895	1664	5608	
OSA	403	5476	1364	1777	6355	0	4500	4744	821	
DHK	4894	1425	3161	3026	1895	4500	0	244	3793	
CCU	5138	1304	3403	3266	1664	4744	244	0	4038	
SEL	1156	4686	871	956	5608	821	3793	4038	0	

	TYO	DEL	SHA	BJ	MUM	OSA	CCU/DHK	SEL	8x8 matrix
TYO	0	5847	1767	2099	6740	403	4894	1156	
DEL	5847	0	4243	3777	1163	5476	1304	4686	
SHA	1767	4243	0	1070	5039	1364	3161	871	
BJ	2099	3777	1070	0	4756	1777	3026	956	
MUM	6740	1163	5039	4756	0	6355	1664	5608	
OSA	403	5476	1364	1777	6355	0	4500	821	
CCU/DHK	4894	1304	3161	3026	1664	4500	0	3793	
SEL	1156	4686	871	956	5608	821	3793	0	

	OSA/TYO	DEL	SHA	BJ	MUM	CCU/DHK	SEL	7x7 matrix
DEL	5476	0	4243	3777	1163	1304	4686	
SHA	1364	4243	0	1070	5039	3161	871	
BJ	1777	3777	1070	0	4756	3026	956	
MUM	6355	1163	5039	4756	0	1664	5608	
OSA/TYO	0	5476	1364	1777	6355	4500	821	
CCU/DHK	4500	1304	3161	3026	1664	0	3793	
SEL	821	4686	871	956	5608	3793	0	

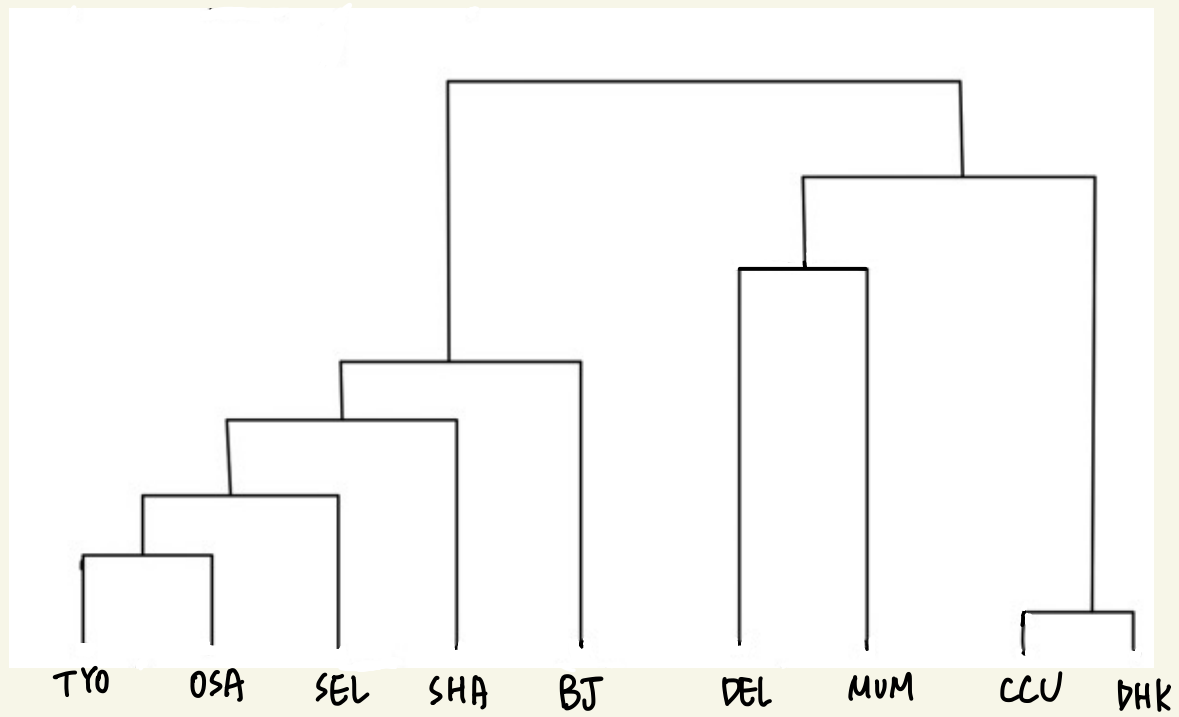|	SEL/OSA/TYO	DEL	SHA	BJ	MUM	CCU/DHK	6x6 matrix
DEL	4686	0	4243	3777	1163	1304	
SHA	871	4243	0	1070	5039	3161	
BJ	956	3777	1070	0	4756	3026	
MUM	5608	1163	5039	4756	0	1664	
SEL/OSA/TYO	0	4686	871	956	5608	3793	
CCU/DHK	3793	1304	3161	3026	1664	0	

	DEL	BJ	SEL/OSA/TYO/SHA	MUM	CCU/DHK	5x5 matrix
DEL	0	3777	4243	1163	1304	
BJ	3777	0	956	4756	3026	
SEL/OSA/TYO/SHA	4243	956	0	5039	3161	
MUM	1163	4756	5039	0	1664	
CCU/DHK	1304	3026	3161	1664	0	

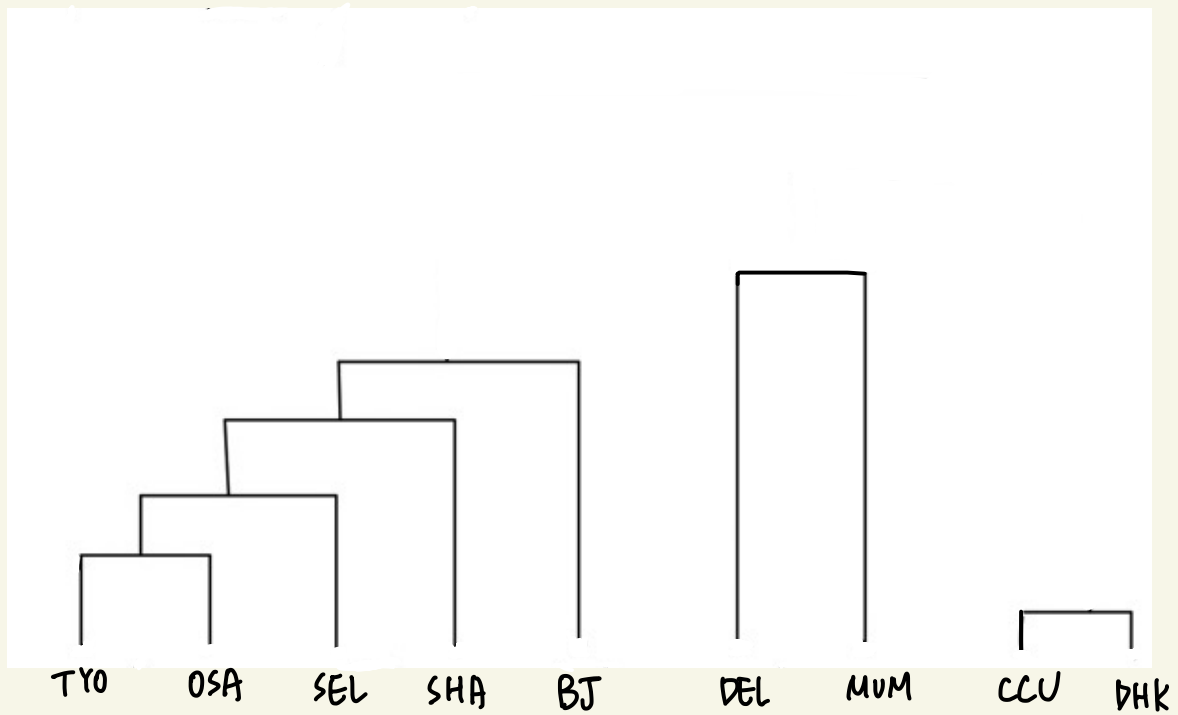|	DEL	SEL/OSA/TYO/SHA/BJ	MUM	CCU/DHK	4x4 matrix
DEL	0	3777	1163	1304	
SEL/OSA/TYO/SHA/BJ	3777	0	4756	3026	
MUM	1163	4756	0	1664	
CCU/DHK	1304	3026	1664	0	

	SEL/OSA/TYO/SHA/BJ	DEL/MUM	CCU/DHK	3x3 matrix
SEL/OSA/TYO/SHA/BJ	0	3777	3026	
DEL/MUM	3777	0	1304	
CCU/DHK	3026	1304	0	

	SEL/OSA/TYO/SHA/BJ	CCU/DHK/DEL/MUM	2x2 matrix
SEL/OSA/TYO/SHA/BJ	0	3026	
CCU/DHK/DEL/MUM	3026	0	

	CCU/DHK/DEL/MUM/SEL/OSA/TYO/SHA/BJ
CCU/DHK/DEL/MUM/SEL/OSA/TYO/SHA/BJ	0

Problem 1(a) (ii)

Problem 1(b) (i)

Problem 1 (b) (i)						
38	127					
x	y	x-x'	y-y'	dx^2	dy^2	sum of square
35.7	139.7	-2.3	12.7	5.29	161.29	12.90658747
28.7	77.2	-9.3	-49.8	86.49	2480.04	50.66093169
31.2	121.5	-6.8	-5.5	46.24	30.25	8.745856162
39.3	116.4	1.3	-10.6	1.69	112.36	10.67941946
19.1	72.9	-18.9	-54.1	357.21	2926.81	57.30636963
34.7	135.5	-3.3	8.5	10.89	72.25	9.11811384
23.8	90.4	-14.2	-36.6	201.64	1339.56	39.25812018
22.6	88.4	-15.4	-38.6	237.16	1489.96	41.55863328
37.6	127	-0.4	0	0.16	0	0.4
27	117					
x	y	x-x'	y-y'	dx^2	dy^2	sum sq
35.7	139.7	8.7	22.7	75.69	515.29	24.31008021
28.7	77.2	1.7	-39.8	2.89	1584.04	39.83628999
31.2	121.5	4.2	4.5	17.64	20.25	6.155485359
39.3	116.4	12.3	-0.6	151.29	0.36	12.31462545
19.1	72.9	-7.9	-44.1	62.41	1944.81	44.80200888
34.7	135.5	7.7	18.5	59.29	342.25	20.03846301
23.8	90.4	-3.2	-26.6	10.24	707.56	26.79178979
22.6	88.4	-4.4	-28.6	19.36	817.96	28.93648216
37.6	127	10.6	10	112.36	100	14.57257699

c1	c2					
12.9065875	24.3100802			TYO	12.9065875	c1
50.6609317	39.83629			DEL	39.83629	c2
8.74585616	6.15548536			SHA	6.15548536	c2
10.6794195	12.3146255			BJ	10.6794195	c1
57.3063696	44.8020089			MUM	44.8020089	c2
9.11811384	20.038463			OSA	9.11811384	c1
39.2581202	26.7917898			DHK	26.7917898	c2
41.5586333	28.9364822			CCU	28.9364822	c2
0.4	14.572577			SEL	0.4	c1

cluster 1
TYO, BJ, OSA, SEL

cluster 2
DEL, SHA, MUM, DHK, CCU

Problem 1(b) (ii)

Problem 1 (b) (ii)			x	y		avg x	avg y
TYO		c1	35.7	139.7		36.825	129.65
BJ		c1	39.3	116.4			
OSA		c1	34.7	135.5			
SEL		c1	37.6	127			
			x	y		avg x	avg y
DEL		c2	28.7	77.2		25.08	90.08
SHA		c2	31.2	121.5			
MUM		c2	19.1	72.9			
DHK		c2	23.8	90.4			
CCU		c2	22.6	88.4			

Problem 1(b) (iii)

Problem 1 (b) (iii)						
	x	y				
c1	36.825	129.65				
c2	25.08	90.08				

c1

x	y	x-x'	y-y'	dx^2	dy^2	sum of square
35.7	139.7	-1.125	10.05	1.265625	101.0025	10.11277039
28.7	77.2	-8.125	-52.45	66.01563	2751.003	53.07558879
31.2	121.5	-5.625	-8.15	31.64063	66.4225	9.902682717
39.3	116.4	2.475	-13.25	6.125625	175.5625	13.47917375
19.1	72.9	-17.725	-56.75	314.1756	3220.563	59.45366368
34.7	135.5	-2.125	5.85	4.515625	34.2225	6.223995903
23.8	90.4	-13.025	-39.25	169.6506	1540.563	41.35472313
22.6	88.4	-14.225	-41.25	202.3506	1701.563	43.63385297
37.6	127	0.775	-2.65	0.600625	7.0225	2.761000724

c2

x	y	x-x'	y-y'	dx^2	dy^2	sum of square
35.7	139.7	10.62	49.62	112.7844	2462.144	50.74375627
28.7	77.2	3.62	-12.88	13.1044	165.8944	13.37904331
31.2	121.5	6.12	31.42	37.4544	987.2164	32.01047953
39.3	116.4	14.22	26.32	202.2084	692.7424	29.9157283
19.1	72.9	-5.98	-17.18	35.7604	295.1524	18.19100877
34.7	135.5	9.62	45.42	92.5444	2062.976	46.42758663
23.8	90.4	-1.28	0.32	1.6384	0.1024	1.3193938
22.6	88.4	-2.48	-1.68	6.1504	2.8224	2.995463236
37.6	127	12.52	36.92	156.7504	1363.086	38.98508433

c1	c2				
10.11277	50.74376	10.11277	c1		TYO
53.07559	13.37904	13.37904	c2		DEL
9.902683	32.01048	9.902683	c1		SHA
13.47917	29.91573	13.47917	c1		BJ
59.45366	18.19101	18.19101	c2		MUM
6.223996	46.42759	6.223996	c1		OSA
41.35472	1.319394	1.319394	c2		DHK
43.63385	2.995463	2.995463	c2		CCU
2.761001	38.98508	2.761001	c1		SEL

ans			
TYO	c1	10.11277	
DEL	c2	13.37904	
SHA	c1	9.902683	
BJ	c1	13.47917	
MUM	c2	18.19101	
OSA	c1	6.223996	
DHK	c2	1.319394	
CCU	c2	2.995463	
SEL	c1	2.761001	

Cluster 1
TYO, SHA, BJ, OSA, SEL

Cluster 2
DEL, MUM, DHK, CCH