Problem #7

a)

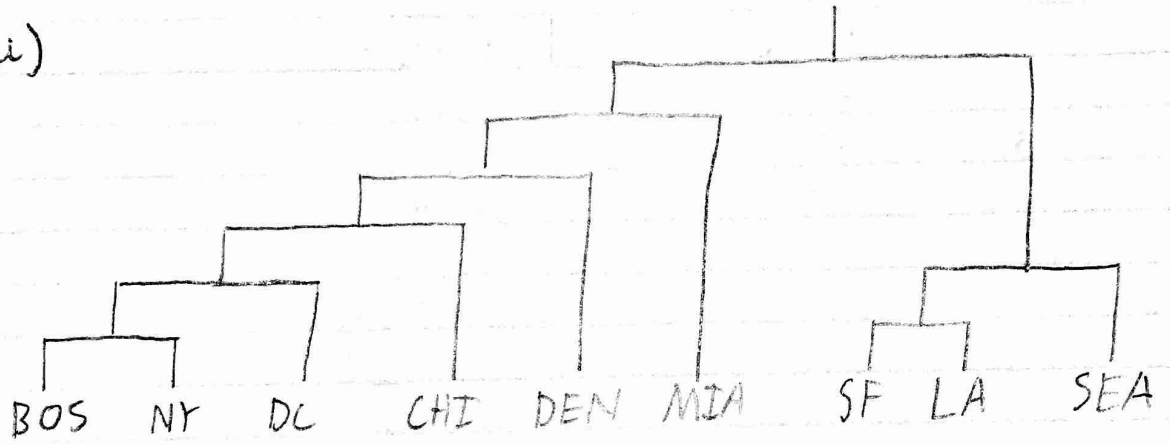
	BOS/NY	DC	MIA	CHI	SEA	SF	LA	DEN
BOS/NY	0	233	1308	802	2815	2934	2786	1771
DC	233	0	1075	671	2684	2799	2631	1616
MIA	1308	1075	0	1329	3273	3053	2687	2037
CHI	802	671	1329	0	2013	2142	2054	996
SEA	2815	2684	3273	2013	0	808	1131	1307
SF	2934	2799	3053	2142	808	0	379	1235
LA	2786	2631	2687	2054	1131	379	0	1059
DEN	1771	1616	2037	996	1307	1235	1059	0

	BOS/NY/DC	MIA	CHI	SEA	SF	LA	DEN
BOS/NY/DC	0	1075	671	2684	2799	2631	1616
MIA	1075	0	1329	3273	3053	2687	2037
CHI	671	1329	0	2013	2142	2054	996
SEA	2684	3273	2013	0	808	1131	1307
SF	2799	3053	2142	808	0	379	1235
LA	2631	2687	2054	1131	379	0	1059
DEN	1616	2037	996	1307	1235	1059	0

	BOS/NY/DC	MIA	CHI	SEA	SF/LA	DEN
BOS/NY/DC	0	1075	671	2684	2631	1616
MIA	1075	0	1329	3273	2687	2037
CHI	671	1329	0	2013	2054	996
SEA	2684	3273	2013	0	808	1307
SF/LA	2631	2687	2054	808	0	1059
DEN	1616	2037	996	1307	1059	0

	BOS/NY/DC/CHI	MIA	SEA	SF/LA	DEN
BOS/NY/DC/CHI	0	1075	2013	2054	996
MIA	1075	0	3273	2687	2037
SEA	2013	3273	0	808	1307
SF/LA	2054	2687	808	0	1059
DEN	996	2037	1307	1059	0

i)



ii) 1 cluster: BOS, NY, DC, CHI, DEN
2 cluster: MIA
3 cluster: SF, LA, SEA

b) ii) $C_1 = (38.0, 103.0)$ $C_2 = (30.0, 78.0)$

City	Distance from C_1	Distance from C_2
BOS	1477 mi	815 mi
NY	1348 mi	728 mi
DC	1219 mi	536 mi
MIA	1367 mi	278 mi
CHI	740 mi	854 mi
SEA	1022 mi	2285 mi
SF	917 mi	2239 mi
LA	773 mi	2046 mi
DEN	138 mi	1444 mi

cluster w/ center as C_1: CHI, SEA, SF, LA, DEN
cluster w/ center as C_2: BOS, NY, DC, MIA

★ NOTE: used an online calculator to calculate distances b/w two coordinates in miles, which gives a slightly different answer than Euclidean, but Chuck Dyer said this was okay!

ii)

cluster	Avg latitude	Avg longitude
CHI, SEA, SF, LA, DEN	40.2	111.1
BOS, NY, DC, MIA	37.2	75.6

C_1: (40.2, 111.1)
C_2: (37.2, 75.6)

iii)

	BOS	NY	DC	MIA	CHI	SEA	SF	LA	DEN
C_1: dis from (40.2, 111.1)	1791	1671	1570	1766	1060	656	546	499	282
C_2: dis from (37.2, 75.6)	375	280	122	723	626	2126	2204	2068	1383

cluster w/ center as C_1: SEA, SF, LA, DEN
cluster w/ center as C_2: BOS, NY, DC, MIA, CHI