Homework 3
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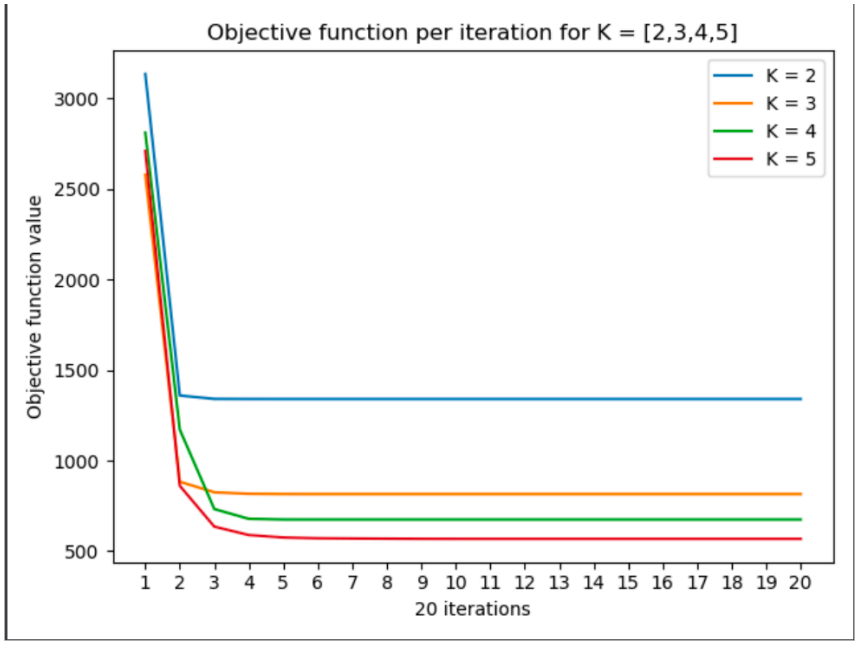
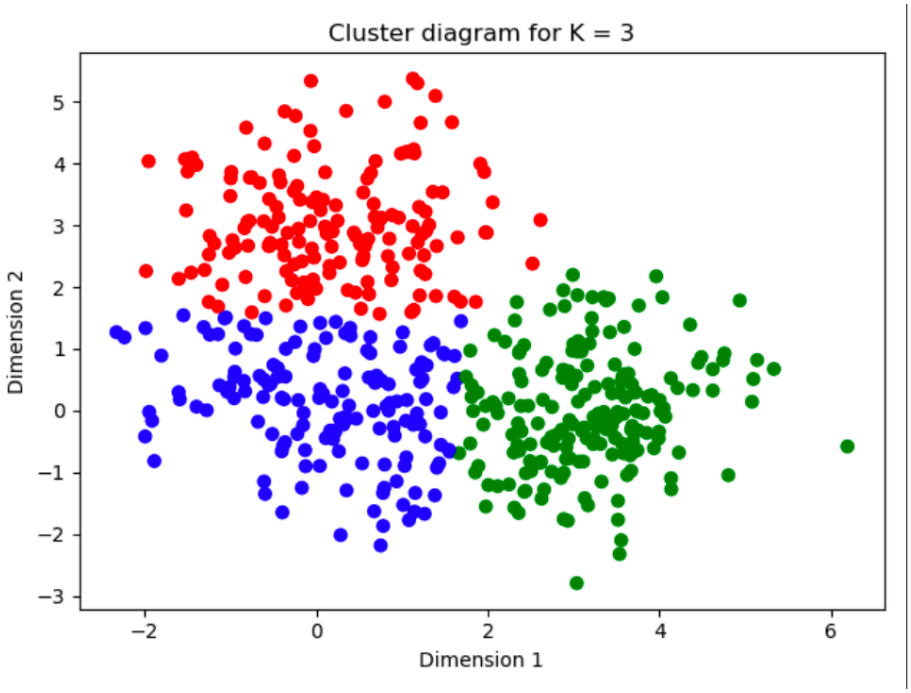
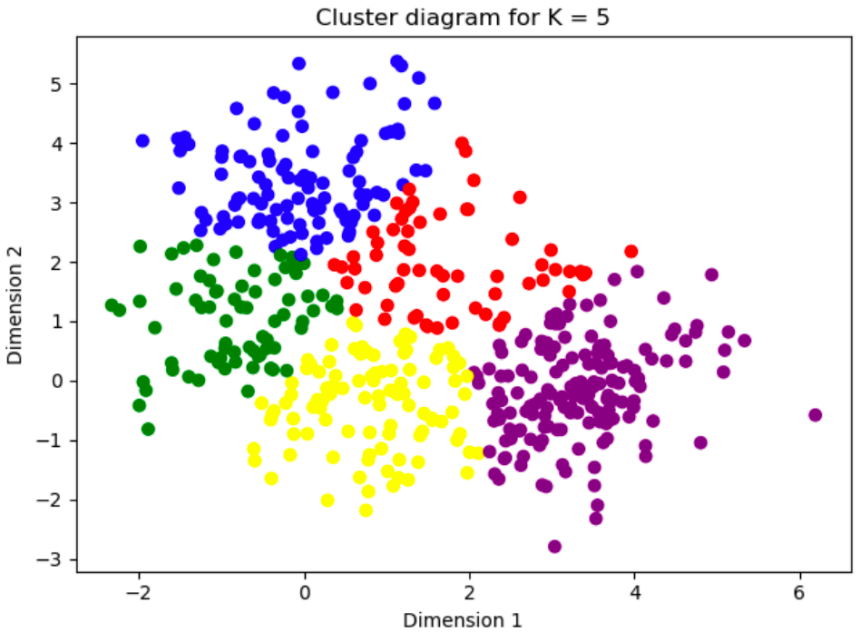
Problem 1

(a)



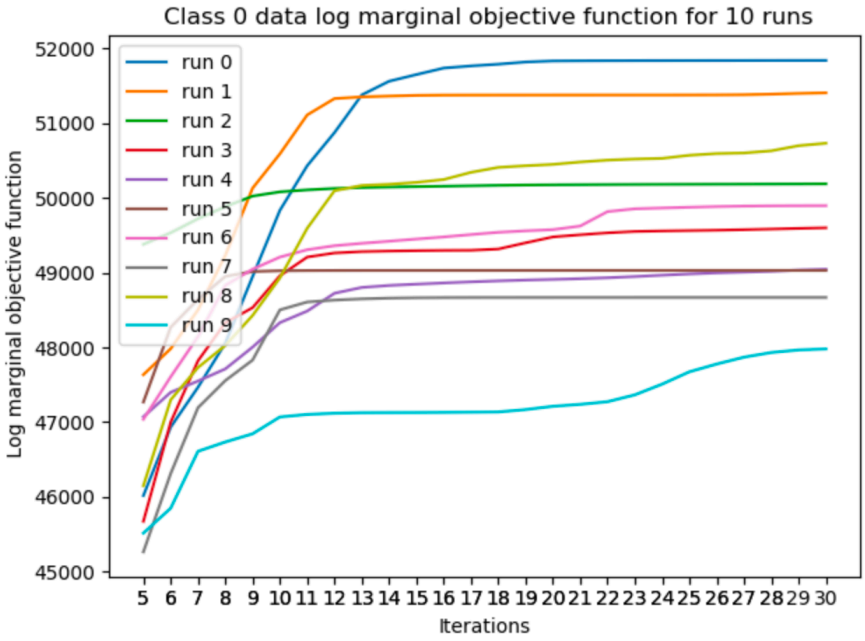
(b)

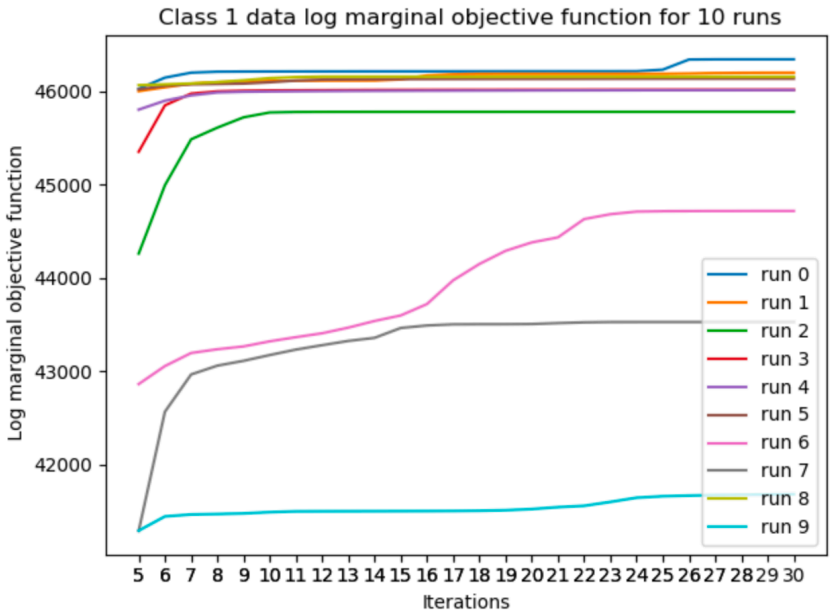



Cluster diagram for K = 5
Dimension 2
Dimension 1
5
4
3
2
1
0
−1
−2
−3
−2
0
2
4
6

Problem 2

(a)


Class 0 data log marginal objective function for 10 runs
Log marginal objective function
Iterations
run 0
run 1
run 2
run 3
run 4
run 5
run 6
run 7
run 8
run 9
52000
51000
50000
49000
48000
47000
46000
45000
5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30



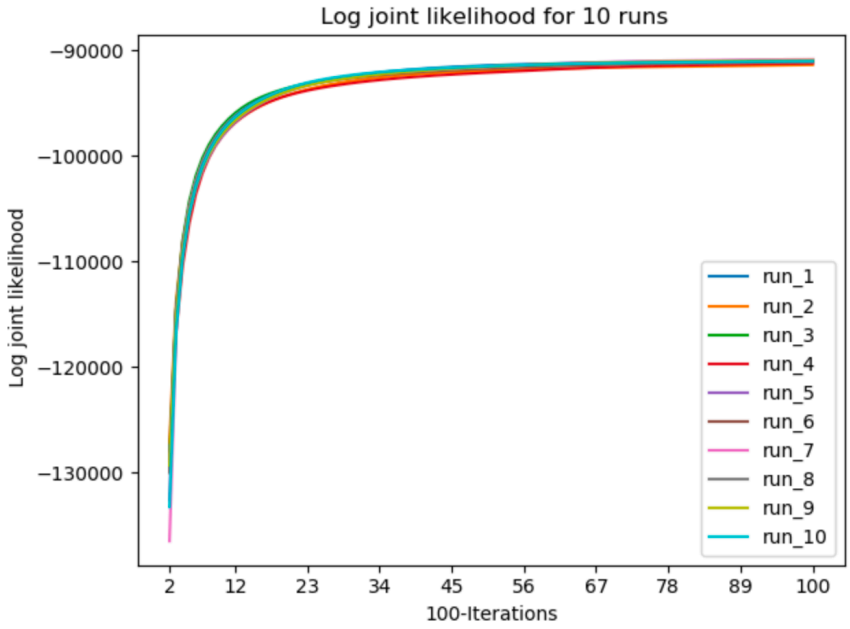
(b)

confusion_matrix

confusion matrix			Accuracy
K = 1			
True\Pred	1	0	0.773913043478261
1	174	8	
0	96	182	
K = 2			
True\Pred	1	0	0.793478260869565
1	176	6	
0	89	189	
K = 3			
True\Pred	1	0	0.808695652173913
1	172	10	
0	78	200	
K = 4			
True\Pred	1	0	0.871739130434783
1	169	13	
0	46	232	

Problem 3

(a)



rank	value of training objective function	RMSE
1.0	-90878.42151895780	1.1230539767109000
2.0	-90953.25492612560	1.133563397478020
3.0	-90966.0416232377	1.1156685445931100
4.0	-90974.70241171020	1.1227557463635300
5.0	-91021.65127587130	1.1193682389610600
6.0	-91048.16716552820	1.1237743943754700
7.0	-91103.10779919600	1.1203892961168500
8.0	-91104.7142887194	1.1213304686207400
9.0	-91250.2159091038	1.1141612534588200
10.0	-91387.98225761070	1.1245075510566000

s

(b)

result_Star Wars

Movie Id	Movie Name	Euclidean distance
171	Empire Strikes Back, The (1980)	0.2631921319115550
173	Raiders of the Lost Ark (1981)	0.6203775706007460
180	Return of the Jedi (1983)	0.6238327540367700
172	Princess Bride, The (1987)	0.7200508528230000
612	My Man Godfrey (1936)	0.8294521265030850
11	Usual Suspects, The (1995)	0.854777474655645
428	Day the Earth Stood Still, The (1951)	0.868056013766078
209	Indiana Jones and the Last Crusade (1989)	0.9262244082758590
203	Back to the Future (1985)	0.972062433372426
175	Aliens (1986)	0.973221091457524

result_My Fair Lady

Movie Id	Movie Name	Euclidean distance
418	Mary Poppins (1964)	0.6774878329032090
735	Shadowlands (1993)	0.7744441446097830
704	Singin' in the Rain (1952)	0.7890430386890840
637	Return of Martin Guerre, The (Retour de Martin Guerre, Le) (1982)	0.7986926361388290
98	Snow White and the Seven Dwarfs (1937)	0.813393209535176
419	Alice in Wonderland (1951)	0.8354496459122630
417	Cinderella (1950)	0.8420510439974060
464	Jungle Book, The (1994)	0.8507777998252780
142	Sound of Music, The (1965)	0.856198215840564
601	American in Paris, An (1951)	0.8704729759419420

result_Goodfellas

Movie Id	Movie Name	Euclidean distance
692	Casino (1995)	0.7002010499401580
503	Bonnie and Clyde (1967)	0.7306767390295780
179	Apocalypse Now (1979)	0.7524054275952210
187	Full Metal Jacket (1987)	0.772566014751989
176	Good, The Bad and The Ugly, The (1966)	0.7765164366305630
134	2001: A Space Odyssey (1968)	0.8806203462802910
186	Godfather: Part II, The (1974)	0.889343113211944
468	Short Cuts (1993)	0.9310331776247470
75	Carlito's Way (1993)	0.9499979483252540
22	Taxi Driver (1976)	0.9573191859579330