Assignment 1:

Problem 1:

1. Answer will be found in code file(main.py).
2. **For k = 3 centers are:**

[[-0.054673664891358977, -0.9558512130581543, -0.7711013852336865, -1.0588407409359033, -0.9362095085852365, -0.9129073654295485, -0.34120961690365526, -0.5462389108934123, -0.5527497618358075, -0.28686240567443755, -0.8625258217985781, -0.8561649362899599, -0.3223549768400189, -0.3735214854547567, -0.7063853285562315, -0.712226059480014, -0.33123709523280737, -0.5568507453467083, -0.8207009193009601, -0.7824401492762962, -0.5888955289907719, -0.7431023039439782, -0.49556435141242416, -0.7904917072907661, -0.9396200161652472, -0.912795580835776], [0.10866400968454142, 0.42990601560367103, -0.03698560552043137, 0.19919572599742905, 0.009534485019555856, -0.0012197104734870208, 0.1625974061203254, 0.0896066391146606, 0.07877846372714634, 0.10897586969802271, -0.027411403956948795, -0.04316311367227237, 0.17219354081716953, 0.21140781588937907, -0.12385141289124983, -0.11437874642046185, 0.10593684962258214, 0.12090316699561673, 0.08966981985147693, 0.10599479212950846, -0.07657481323385879, 0.03853578722481291, 0.05796171086910334, -0.05114162823553175, 0.3325217459551753, -0.010496188902439293], [-0.1412496267583108, 0.6466367242050087, 1.3353047416342239, 1.3036154686109742, 1.5058083907524769, 1.4906247918539572, 0.2114651745778677, 0.7004033498331813, 0.7339717686908164, 0.23655687748952509, 1.464029265920413, 1.4870546471378525, 0.16038830571683177, 0.1606554516057699, 1.413973080876107, 1.4034114193638012, 0.31533034402960236, 0.6513520008844267, 1.1476424803754341, 1.0506684840058056, 1.1222383163107386, 1.1295608865120814, 0.6848910657597526, 1.3969217347432743, 0.8266345249243814, 1.5101087172354857]]

**For k = 5 centers are**:

[[-0.04637784439017029, -0.7607358596416554, -0.7323694011069081, -0.9875293673857909, -0.8854325902142489, -0.8650541982585817, -0.24855634136535118, -0.5161588600294207, -0.5141161416310382, -0.19187167750589368, -0.8152010109265834, -0.8162868152554857, -0.06682147064586036, -0.2840215702265526, -0.6678335183139569, -0.6831544135395874, -0.030724346191291007, -0.5584877368384359, -0.7723030107971878, -0.7469278000003932, -0.5476480399155019, -0.6977990047952547, -0.49176155606070715, -0.7280040435334981, -0.8557944996387802, -0.8636236319681166], [-0.0997738886192728, 0.6257534133957864, 1.3833983916337251, 1.3773942197289926, 1.6821588688301643, 1.6929735481397368, 0.13156244781662557, 0.770758370318744, 0.8067303785478692, 0.3499500604647822, 1.640482310873672, 1.7033571074826015, 0.09230231177974639, 0.07076094472253847, 1.5942318701413796, 1.5222537325945218, 0.3979689824553681, 0.524334577082651, 1.1216670123711872, 0.990493607302575, 1.406007924977017, 1.2665768215351259, 0.540389866588819, 1.5710594410349268, 0.7526853455988385, 1.6889079861975307], [-0.40042729081016515, -1.8959532604798088, -0.8688312248515421, -1.357038666705864, -1.2746857426296965, -1.1278289871837055, -2.514241012668661, -0.3344660003728272, -0.4466590271471797, 0.29715547417017896, -1.3394600174080882, -1.1799671898628776, -3.9832982400798804, -2.061607552353073, -1.0352477753479146, -1.0277414568657401, -3.246160018713343, -0.7909096577742734, -1.1915160168695833, -1.1320575263884776, -0.7833968713459734, -0.8074117528136897, -0.7979241189578876, -1.144694158755594, -1.3742055090810954, -1.2095787288894924], [0.13548678501672876, 0.5101461813711288, 0.035255614113357286, 0.409151077467022, 0.14608690090964138, 0.23377553338544738, -0.1778920082989799, 0.6253076138443567, 0.6500388014307955, 0.5108664078278761, -0.0882611815228187, -0.05055492099868308, -0.031394639367035994, 0.0947111146737406, -0.054132355884541114, -0.09673293095538098, 0.30489427620871984, -0.33988495759352094, -0.06332924689400624, -0.154685891993787, 0.13518987463316623, 0.2730763861299377, -0.3179737554521114, 0.10734833993717625, 0.25505435923496883, 0.17263093198170795], [0.0012456545168670799, 0.2344518560672937, 0.1477125551820528, 0.042465219002313995, 0.01049687460895451, -0.2265493992359435, 1.0784745054453924, -0.8511827671035298, -0.9202170254701062, -0.9619437641965377, 0.3576148235459677, 0.20252259473926856, 0.7048164632830237, 0.6342031675178706, -0.0005847117514094579, 0.18016444046983995, -0.4107676113148324, 1.345223234056738, 0.7217692813226049, 0.9631533400368, -0.4432706947020106, -0.25646346672102815, 1.1560095933674694, -0.14092320290081628, 0.6930489106588844, -0.09915189004151549]]

This is the o/p from cluster 3 and 5. We can sae that while the value of k becomes bigger than other one the result are much accurate.

3)

4) **For k = 3 centers are:**

[[0.04257833513784094, -0.165814640073186, -0.07419135398776933, -0.5487185942995593, -0.4495084584613463, -0.5401564448790355, -0.42446448595514835], [-0.9321152302016162, 0.5893775811145616, -0.37370620614770766, 1.4325350389482876, -0.25554836234236206, 0.042752708790834176, 1.6575130311078756], [0.4889894463858669, -0.006958953816233356, 0.3946330589135561, 0.3001097968921101, 1.1375925837135232, 1.148702733771301, -0.11065340997291112]]

**For k = 5 centers are:**

[[0.33536550949403915, -4.069112747451931, -3.5564943469086696, -1.1282815104549178, -0.8014911258610393, -0.7452628980759645, -0.7860935063324846], [-0.6634513455016361, 0.5121859252069387, -0.3026602875024391, 1.809395952255769, -0.0943504267889111, 0.25222622046452625, 1.9461019751284174], [-1.4301740609386424, 0.5271959888657435, -0.5840898910069969, -0.38548523323892603, -0.7387151408087695, -0.8340469762727148, -0.07335945592045737], [0.4755698762663326, 0.0190261323914294, 0.42818862457044965, 0.3579320166970364, 1.5032119434184184, 1.4501815285892612, -0.09017049256044614], [0.4371056160125916, -0.11701765070029127, 0.27150105792789153, -0.40353714106593275, -0.24032254481287407, -0.2797911852062794, -0.3930114085974029]]

By taking few data columns we can see that