1. Given the following 4 points with 2 attributes:

A: (2, 2), B: (2, 3), C: (3, 5), D: (4, 3).

The distance function is Euclidean distance.

Perform agglomerative hierarchical clustering using the single link (or MIN) approach and the complete link (or MAX) approach, respectively. Show the order in which the points are merged.

2. We consider the following 6 data points:

p1: (5, 9), p2: (5, 8), p3: (3, 8), p4: (1, 2), p5: (2, 1), p6: (4, 4).

The distance function is Euclidean distance.

Find the clusters in this data set based on DBSCAN, with Eps=2 and Minpts=3. Identify the core points, border points and noise points.

3. Given the following 6 points with 2 attributes:

A: (1, 3), B: (2, 1), C: (2, 2), D: (3, 5), E: (4, 4), F: (3, 3).

a) We need to group all 6 points into three clusters. Suppose initially we assign B, D and E as the prototype of the first, second and third cluster respectively. Use the k-Means algorithm to find the three clusters and their respective centroids after the first iteration.

b) If the initial class label of A, D and E is “C1”, the initial class label of B, C and F is “C2”, use the k-Means algorithm to find the two clusters and their respective centroids until convergence.