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.

a) After the first iteration:

The first cluster is {A, B, C}, and its centroid is (5/3, 2).

The second cluster is {D}, and its centroid is (3, 5).

The third cluster is {E, F}, and its centroid is (3.5, 3.5).

b) Initially, the first cluster “C1” is {A, D, E}, and its centroid is (8/3, 4).

The second cluster “C2” is {B, C, F}, and its centroid is (7/3, 2).

After the first iteration, the first cluster “C1” is {D, E, F}, and its centroid is (10/3, 4).

The second cluster “C2” is {A, B, C}, and its centroid is (5/3, 2).

Then, the k-Means algorithm is convergence.