Assignment 7: C libraries

1. Implement K-Means using a static library. Show the output using an animation created using gnuplot from the output of your program based on points (p_{ij}) and given number of clusters (`n_clust`). Also print the coordinates of the centroids (c_{ij}). The dimension of the data is also specified (`dim`).

   Input: (n, dim, n_clust, $c_{i,j}$, $p_{i,j}$)

```
20 3 2

10   8    15
7    17   10

1    20   10
2    19   10
3    18   10
4    17   10
5    16   10
11   10   15
12   9    15
13   8    15
14   7    15
15   6    15
6    15   10
7    14   10
8    13   10
9    12   10
10   11   10
16   5    15
17   4    15
18   3    15
19   2    15
20   1    15
```

   Output: ($p_{i,j}$, $cluster_i$, $centroid_i$)

```
1    20   10      1     5.5 15.5 10
2    19   10      1     5.5 15.5 10
3    18   10      1     5.5 15.5 10
4    17   10      1     5.5 15.5 10
5    16   10      1     5.5 15.5 10
11   10   15      0     15.5 5.5 15
12   9    15      0     15.5 5.5 15
13   8    15      0     15.5 5.5 15
14   7    15      0     15.5 5.5 15
15   6    15      0     15.5 5.5 15
6    15   10      1     5.5 15.5 10
7    14   10      1     5.5 15.5 10
8    13   10      1     5.5 15.5 10
9    12   10      1     5.5 15.5 10
10   11   10      1     5.5 15.5 10
16   5    15      0     15.5 5.5 15
17   4    15      0     15.5 5.5 15
18   3    15      0     15.5 5.5 15
19   2    15      0     15.5 5.5 15
20   1    15      0     15.5 5.5 15
```

Note

a. Format of the generated output is not important.
b. Instructions to create a C library are available on internet. For example, check this site.
c. Output animation may look something similar as shown in this youtube video.
d. The order of cluster IDs may vary (ie., the coordinates of centroids may be assigned randomly to clusters).
e. There can be more parameters assigned to the function being called from the library. But the minimum inputs are the number of points (`n`), dimension of the data (`dim`), number of clusters (`n_clust`), initial coordinates of the centroids ($c_{i,j}$), and the points themselves ($p_{i,j}$).