Height 185, 170, 168, 179, 182, 188, 180, 180, 183
weight 72, 56, 60, 68, 72, 77, 71, 70, 84, 88

Step 1 — Input dataset, clustering variable, & maximum no. of cluster (K is means clustering)

In This datasets, only two variables, height & weight - are considered for clustering

step 2 : Initialize cluster centroid

In this example, value of K is considered as 2, cluster centroids are initialized with first 2 observation

cluster	Initial centroid	
	Height	weight
K1	185	72
K2	170	56

Step -13:

Calculate euclidean Distance

euclidian is one of the distance measure used on k-means algorithm. euclidean distance setn of a obeservation & initial cluster centroids 1 & 2 is calculated. based on euclidean dist, each obsservation is assigned to one of the cluster - based on minimum distance

euclidean Distance =

$$\sqrt{(X_H - X_1)^2 + (X_w - W_1)^2}$$

where

X_H = observation value of variable Height

X_1 = centroid value of cluster 1 for var. Heit

X_w = observation value of variable weight

W_1 = centroid value of cluster 1 for variable Height.

first two observation

Height	Weight
185	72
170	56

Now Initial cluster centroids are

Cluster	Updated Centroid	
	Height	Weight
K1	185	72
K2	170	56

Euclidean distance calculation from each of the cluster is calculated

Euclidean Distance from Cluster 1 $\underline{\underline{1}}$	Euclidean distance from Cluster 2 $\underline{\underline{2}}$	Assignment
$(185-185)^2+(72-72)^2$ $=0$ ✓	$(185-170)^2+(72-56)^2$ $=21.93$	①
$(170-185)^2+(56-72)^2$ $=21.93$	$(170-170)^2+(56-56)^2$ $=0$ ✓	②

we have considered two observations for assignment only because we knew the assignment & there is no change in centroids as these two observations were only considered as initial centroids

Step 4 : Move on to next observation & calculate Euclidean distance

Height	weight
168	60

ED from Cluster 1   ED from cluster 2   Assign

$(168-185)^2+(60-72)^2$ $(168-170)^2+$
$=20.808$ $(60-56)^2$
                                         $=4.472$ ✓   ②

Since distance is min from cluster 2, so the observation is assigned to cluster 2. Now revise cluster centroid – mean value height & weight as cluster centroids. addition is only to cluster 2 so centroid of cluster 2 will be updated

update cluster centroid

cluster	Updated Height	Centroid Weight
K=1	185	72
K=2	$(170+168)/2$ $= 169$	$(56+60)/2$ $= 58$

Step 5 :- Calculate Ed for the next observation assign next observation based on minimum Ed & update the cluster centroids

Next observation

Height	weight
179	68

ED calculation & Assign.

ED from C 1	ED from C 2	Assignment
$(185-179)^2 + (68-72)^2$	$(169-179)^2 + (58-68)^2$	
$6^2 + 4^2$		01
$36 + 16$	$(14.1421 4)$	
52	✗	
✓ (7.21103)		

update cluster centroid

cluster	updated centroid	
	ht	wt
k=1	182 (185+179)/2 (72+68)/2 70.66	
k2	169	58

continue the steps until all observations are assigned

final:-

Height	weight	Assignment
185	72	1
170	56	2
168	60	2
179	68	1
182	72	1
188	77	1
180	71	1
180	70	1
133	84	1
180	88	1
180	67	1
177	76	1

Clustered centroid

Cluster	Updated centroid	
k=1	182.8	72
k=2	169.0	58.0