* Suppose that we have four observations, for which we compute a dissimilarity matrix, given by

$$\begin{bmatrix} & 0.3 & 0.4 & 0.7 \\ 0.3 & & 0.5 & 0.8 \\ 0.4 & 0.5 & & 0.45 \\ 0.7 & 0.8 & 0.45 & \end{bmatrix}$$

For instance, the dissimilarity between the second and fourth observations is 0.8.

@ On the basis of dissimailarity matrix, sketch the dendrogram that results from hierarchically clustering these four observations using complete linkage.

→ ~~with~~ 0.3 is the minimum dissimilarity, so we combine obs 1 and 2 to form cluster (1,2) at height 0.3.
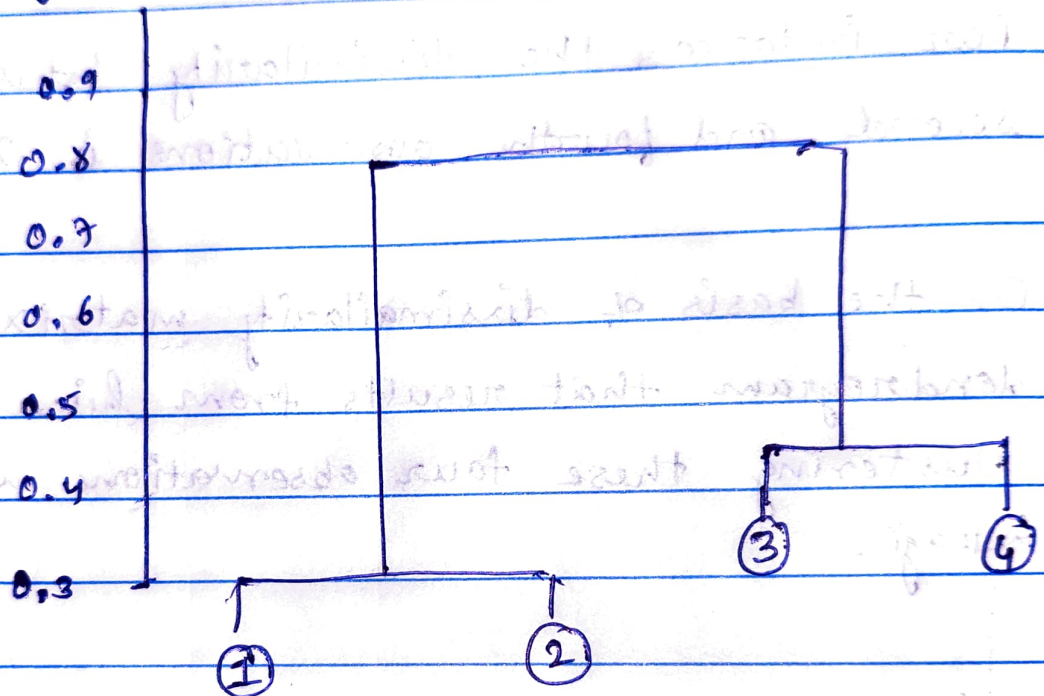
We now have:-

$$\begin{pmatrix} & 0.5 & 0.8 \\ 0.5 & & 0.45 \\ 0.8 & 0.45 & \end{pmatrix}$$

→ minimum dissimilarity 0.45 so we fuse obs 3 and 4 to form a cluster (3,4) at height 0.45

Now we have

$$\begin{pmatrix} & 0.8 \\ 0.8 & \end{pmatrix}$$

→ Now, we fuse clusters (1,2) and (3,4) to form cluster ((1,2), (3,4)) at height 0.8.

(b) Repeat (a), this time using single linkage clustering.

→ We see 0.3 is minimum dissimilarity, so we fuse obs 1 & 2 at height 0.3
We have now :-
new dissimilarity matrix

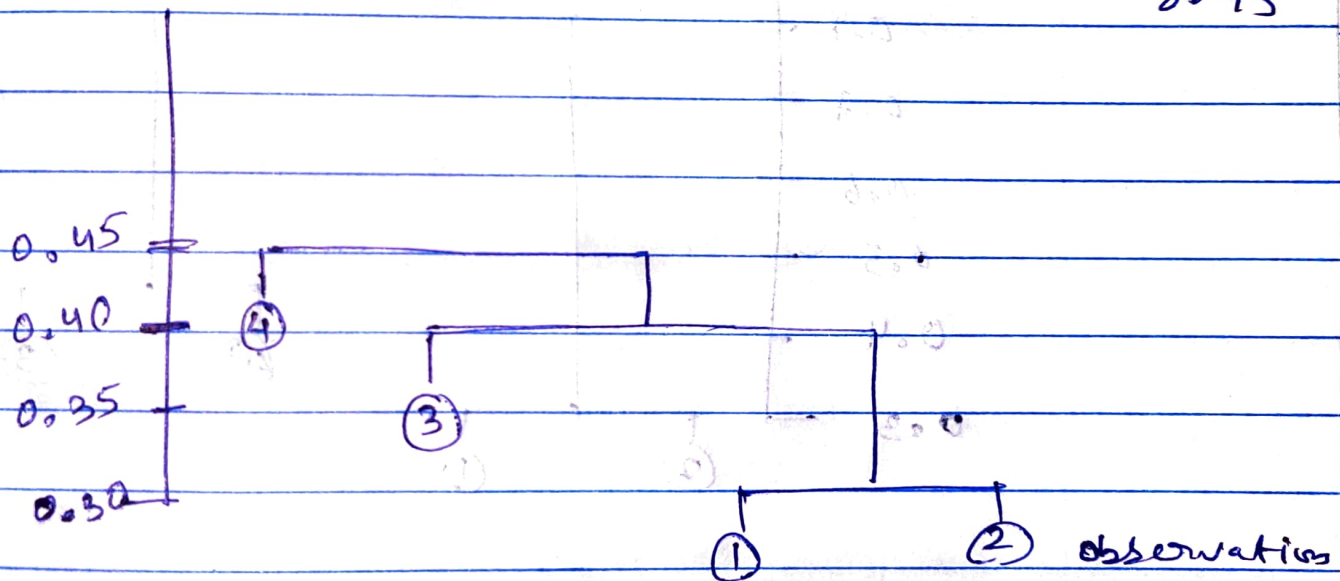$$\begin{pmatrix} & 0.4 & 0.7 \\ 0.4 & & \\ 0.7 & 0.45 & \end{pmatrix}$$

We now see that minimum dissimilarity
is 0.4, so we fuse cluster(1,2) and obs 3
to form ((1,2),3) at height 0.4

Now we have :-

$$\begin{pmatrix} & & 0.45 \\ 0.45 & & \end{pmatrix}$$

→ Fuse clusters ((1,2),3) and obs 4 to form
        Cluster Dendrogram (((1,2),3),4)
                                at height
                                    0.45

c) Suppose that we cut the dendrogram obtained
in (a) such that two clusters results. Which
observations are in each cluster?

→ We will have clusters (1,2) and (3,4).

(d) Suppose that we cut the dendrogram obtained in (b) such that two clusters result. Which observations are in each cluster?

→ In this case, we have clusters
$$((1,2), 3) \text{ and } (4).$$

(e)