col, row

12.6.2 a)

Dissimilarity matrix :-

	1	2	3	4
1	0	0.3	0.4	0.7
2	0.3	0	0.5	0.8
3	0.4	0.5	0	0.45
4	0.7	0.8	0.45	0

0.3 is minimum, so we fuse observations 1 & 2 to form cluster (1,2) at hight 0.3.

Distance of (3) to (1,2)

$= \max(3 \to 1, 3 \to 2)$

$= \max(0.4, 0.5)$

$= 0.5$

Distance of 4 to (1,2)

$= \max(4 \to 1, 4 \to 2)$

$= \max(0.7, 0.8)$

$= 0.8$

So the matrix :

~~Distance~~

	12	3	4
12	0	0.5	0.8
3	0.5	0	0.45
4	0.8	0.45	0

Now, minimum disimilarity is 0.45, so we fuse observations 3 and 4 to form cluster (3,4) at height 0.45.

Distance of $12 \rightarrow 34$ =

$\max(12 \rightarrow 3, 12 \rightarrow 4)$

$\max(0.5, 0.8)$

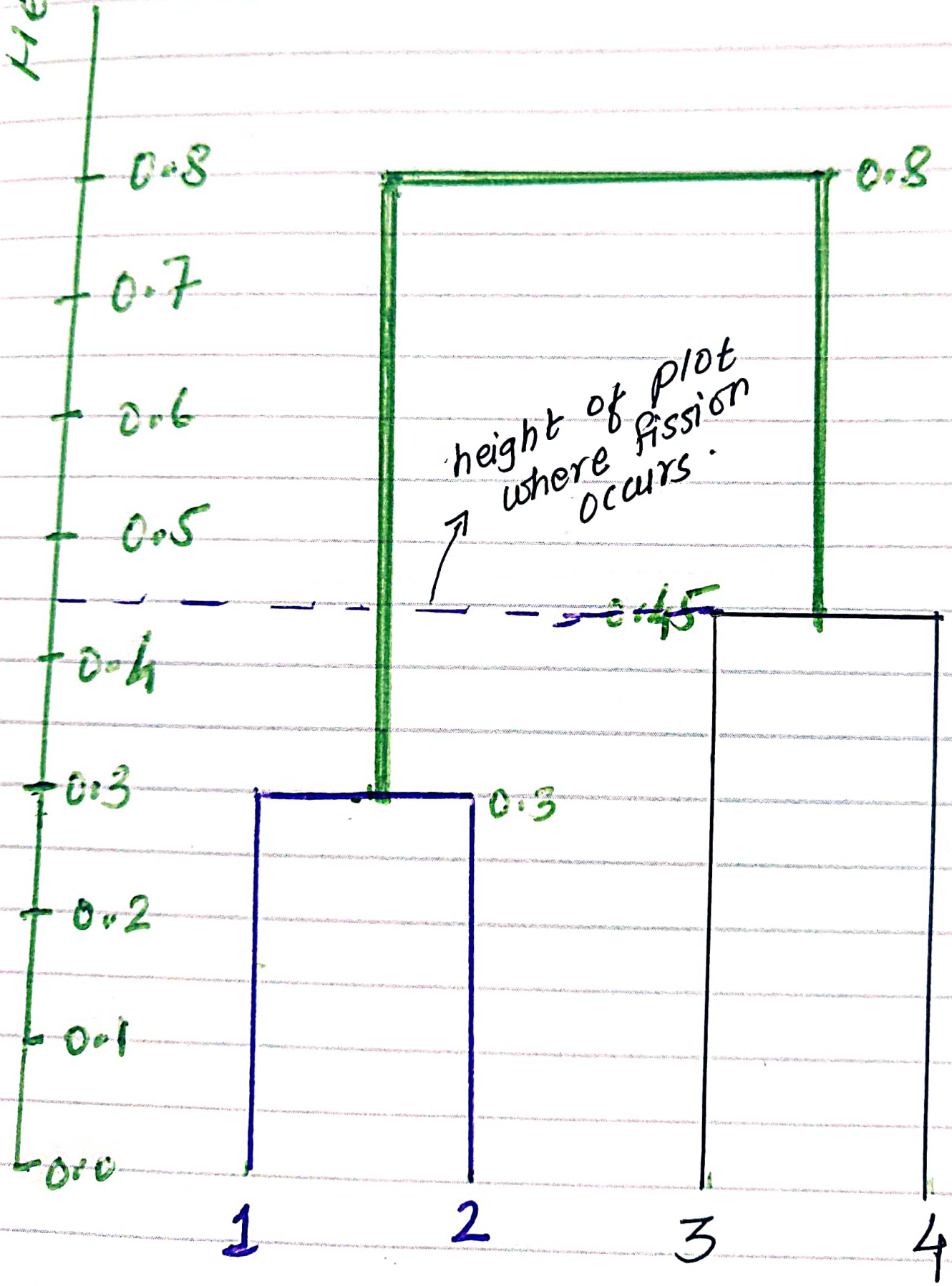
$= 0.8$

So the matrix :-

	12	34
12	0	0.8
34	0.8	0

Now, ~~fuse~~ 0.8 is remaining, fuse clusters (1,2) & (3,4) at height 0.8.

Final dendrogram for complete linkage.



12.6.2

b) Here ~~to~~ simple linkage takes the minimum distance, instead of max.

⇒ we have dissimilarity matrix:

	1	2	3	4
1	0	0.3	0.4	0.7
2	0.3	0	0.5	0.8
3	0.4	0.5	0	0.45
4	0.7	0.8	0.45	0

Here 0.3 is the minimum, so fuse 1 & 2 to form (1,2) cluster at height 0.3.

Distance of (3) to (1,2)

$\min(0.4, 0.5) = 0.4$

Distance of 4 to (1,2)

$= \min(0.7, 0.8) = 0.7$.

so we have: -

	12	3	4
12	0	0.4	0.7
3	0.4	0	0.45
4	0.7	0.45	0

Now, we have 0.4 as min.

so fuse cluster (1,2) and (3)

to form cluster [(1,2),3] at height 0.4.

⇒ Distance of (4) to (123)

$\min(4 \to 12, 4 \to 3)$

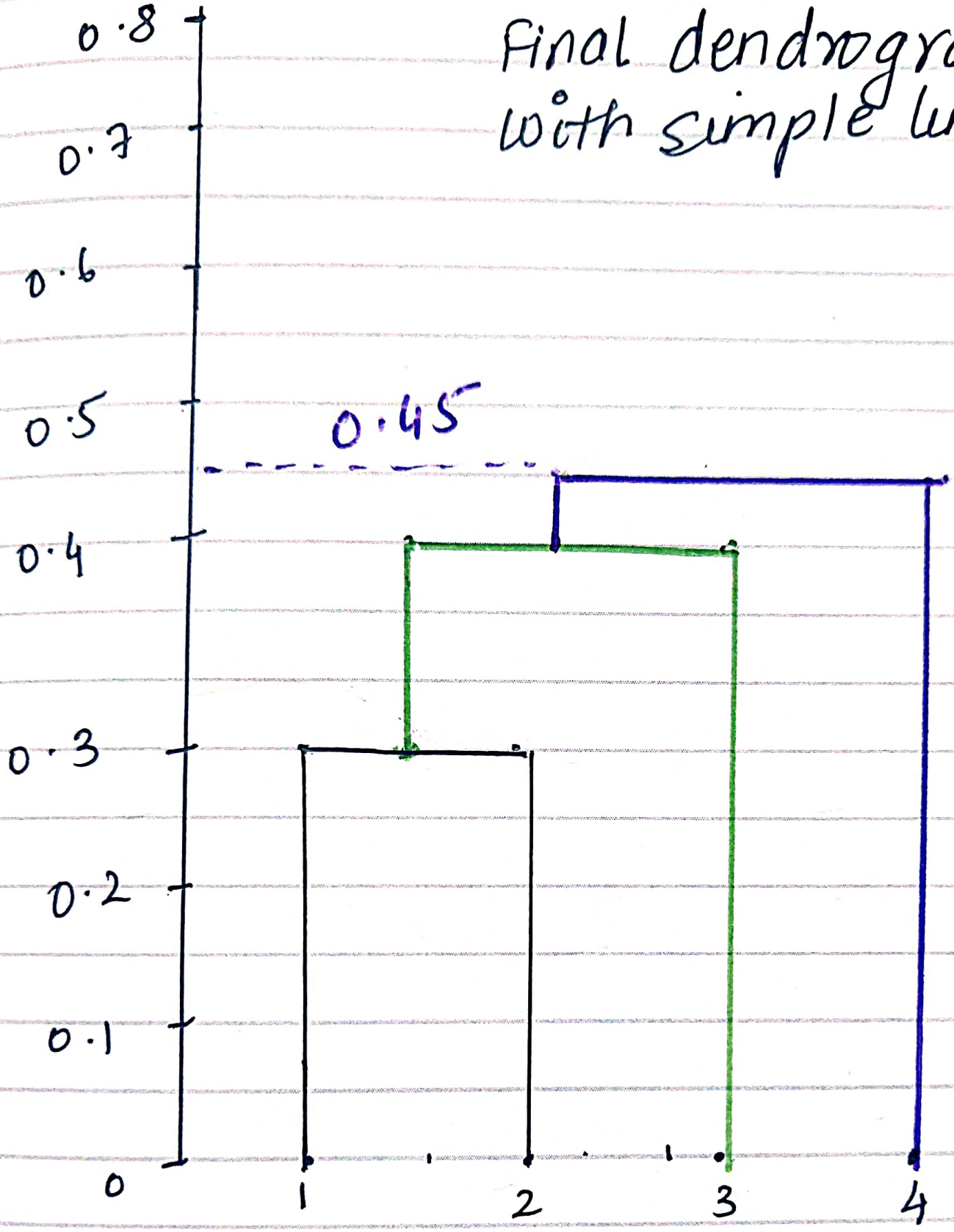
$\min(0.7, 0.45) = 0.45$

∴ matrix is :-

	123	4
123	0	0.45
4	0.45	0

Now, 0.45 is remaining, fuse (1,2,3) & (4) at height 0.45 to form (1,2,3,4) cluster.

Final dendrogram with simple linkage



12.6.2

c).

We will get clusters (1,2) & (3,4), as these are the most dissimilar.

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d). In this case, we will get clusters (1,2,3) & (4), as these are the most dissimilar.

e) : Swapping the clusters (1,2) & (3,4)

and the leaves → (2,1)

→ (4,3) .