

UPGMA Problem (IBO level)

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You are given the following distance matrix for four species (A, B, C, D).

	A	B	C	D
A	0	8	0	8
B	8	0	8	0
C	0	8	0	10
D	8	0	10	0

Tasks:

1. Calculate the first clustering step.
2. Update the distance matrix.
3. Continue until all taxa are clustered.
4. Draw the resulting rooted tree with branch lengths.
5. Is this tree ultrametric? Explain.