Definition: A $\boxed{\text{dissimilarity map}}$ on X is a function $\delta : X \times X \to \mathbb{R}$ with $\delta(x,x) = 0$ and $\delta(x,y) = \delta(y,x)$ for all $x, y \in X$.

Definition: A dissimilarity map δ on X is an $\boxed{\text{ultrametric}}$ if for distinct $x, y, z \in X$, $\delta(x,y) \leq \max\{\delta(x,z), \delta(y,z)\}$.

1. The dissimilarity map δ for 5 species, a, b, c, d, and e is shown below. Find an example to show that δ is *not* an ultrametic. Then perform UPGMA to find a tree relating these species. Use the tree to find a new dissimilarity map δ' that *is* an ultrametric.

δ	a	b	c	d	e
a	0	4	6	5	5
b		0	3	5	4
c			0	2	1
d				0	3
e					0