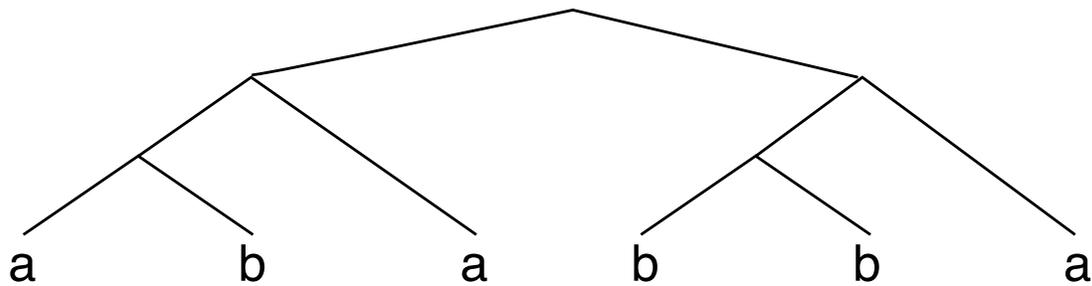


Ancestral Reconstruction: Sankoff's Algorithm

1. Run Sankoff's algorithm on the example tree below to obtain assignments of bases to ancestral nodes. Use the mutational score matrix (σ) below.

σ	a	b
a	0	2
b	1	0



2. Let n be the number of leaves in a sample and k be the size of the character state space (i.e. number of possible characters). What is the runtime of Fitch's algorithm?
3. What is the runtime of Sankoff's algorithm?

4. Run Sankoff's algorithm on the example tree below to obtain assignments of bases to ancestral nodes. Use the mutational score matrix (σ) below.

δ	A	C	G	T
A	0	1	1	1
C	2	0	2	4
G	0	2	0	3
T	1	1	3	0

