

Homework 3

Phylogenetic Networks

Due date: 08/05/2014

1. (2 points) Let the following X -splits: $a|bcdefg$, $bc|adefg$, $abcd|efg$, $abcdef|g$ (here for brevity, a string such as $abcd$ is understood as the set $\{a, b, c, d\}$) be given. Construct an X -tree that induces exactly the given X -splits.
2. (3 points) Let X be a set of n elements, where $n \geq 1$, and let Σ be a set of pairwise compatible X -splits. What is the maximum number of elements Σ can have?
3. (3 points) Let Σ be the set of the following X -splits (using the same notation as in question 1): $ab|cdefgh$, $c|abdefgh$, $abfg|cdeh$, and $abdef|cgh$. Show that there exists no X -tree that induces exactly the X -splits in Σ . Construct a split network for Σ .
4. (2 points) Let G be a split graph, and let c be an edge color. Define X and Y as in the proof of Theorem 2 in the lecture. Prove that any edge joining a vertex in X and a vertex in Y has color c .