

Homework 2

Phylogenetics

Due date: Thu., 31/10/2013

1. (2 points) Show that a tree with exactly two leaves is a path graph.
2. (3 points) Let T be a tree, and assume that the largest degree of a vertex of T is k . Show that T has at least k leaves.
3. (2 points) A forest is a collection of trees. Show that G is a forest if and only if every edge of G is a cut-edge.
4. (1 point) Let $U(X)$ and $B(X)$ be the set of binary, unrooted and rooted phylogenetic trees on X , respectively. Let $\psi_x: U(X) \rightarrow B(X \setminus \{x\})$, where x is some element of X and ψ_x is defined as in the lecture. Show that ψ_x is bijective.
5. (2 points) Let T be a rooted phylogenetic tree on X , and let X' be a (nonempty) subset of X . Devise an algorithm to check if X' is a cluster induced by a vertex of T .