



Phylogenetic networks

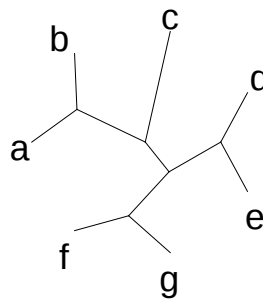
Summer 2013

Assignment 3

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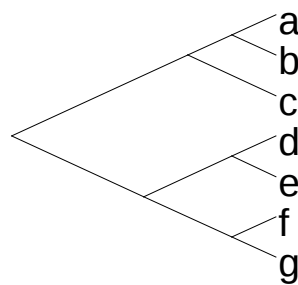
1. Splits from tree (1 point)

Write down all splits encoded by the following tree:



2. Clusters from tree (1 point)

Write down all clusters encoded by the following tree:



3. Tree from splits (1.5 points)

Let $X = \{a, b, \dots, g\}$. Consider the following set of splits, plus all trivial splits:

$$\{a, b, c, d, e\} \mid \{f, g\} \quad \{a, d\} \mid \{b, c, e, f, g\} \quad \{b, c, f, g\} \mid \{a, d, e\} \quad \{c, f, g\} \mid \{a, b, d, e\}$$

Either draw the corresponding unrooted phylogenetic tree or prove that these splits can't be represented by such a tree.

4. Tree from splits (1.5 points)

Let $X = \{a, b, \dots, g\}$. Consider the following set of splits, plus all trivial splits:

$$\{a, b, c, d, e\} \mid \{f, g\} \quad \{a, d\} \mid \{b, c, e, f, g\} \quad \{b, c, f, g\} \mid \{a, d, e\} \quad \{d, f, g\} \mid \{a, b, c, e\}$$

Either draw the corresponding unrooted phylogenetic tree or prove that these splits can't be represented by such a tree.

5. Tree from clusters (1.5 points)

Let $X = \{a, b, \dots, g\}$. Consider the following set of clusters, plus all trivial clusters:

$\{a, e, d, g\}$ $\{b, f, g\}$ $\{c, f\}$ $\{d, e\}$ $\{e, d, g\}$

Either draw the corresponding rooted phylogenetic tree or prove that these clusters can't be represented by such a tree.

6. Tree from clusters (1.5 points)

Let $X = \{a, b, \dots, g\}$. Consider the following set of clusters, plus all trivial clusters:

$\{a, c, d, e\}$ $\{b, f, g\}$ $\{c, d, e\}$ $\{d, e\}$ $\{f, g\}$

Either draw the corresponding rooted phylogenetic tree or prove that these clusters can't be represented by such a tree.

7. Split encoding (2 points)

Let T be an unrooted phylogenetic tree on taxon set X . Design an algorithm that computes all nontrivial splits represented by T .