

Homework 6

Phylogenetics

Due date: Thu., 28/11/2013

1. (2 points) Let $X = \{a, c, \dots, f\}$, and let Σ consist of the splits $\sigma_1 = \{a, b, f\}|\{c, d, e\}$, $\sigma_2 = \{a, b, c\}|\{d, e, f\}$, $\sigma_3 = \{a, b\}|\{c, d, e, f\}$, and $\sigma_4 = \{d, e\}|\{a, b, c, f\}$. Draw $\mathcal{C}(\Sigma)$ and $G(\Sigma)$, and identify which edges of $G(\Sigma)$ represent which elements of Σ .
2. (2 points) Prove Lemma 2 in the lecture.
3. (3 points) Prove Theorem 4 in the lecture.
4. (3 points) By Theorem 4, there exists a path joining two vertices $\mathcal{C}$ and $\mathcal{C}'$ of $G(\Sigma)$. Show that if a k -clique contains A^c for some A in $\mathcal{C} \cap \mathcal{C}'$, then it cannot lie on any path joining $\mathcal{C}$ and $\mathcal{C}'$.