Practice Problems: Gomory-Hu Tree

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Submit the solutions of the questions marked ($\star$) in PDF format generated using Latex by **January 15, 2026**. Discussion is encouraged but every student should write his/her solution independently.

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1. **($\star$)** Deign an iterative algorithm to compute a Gomory-Hu tree of a connected undirected weighted graph by computing $n-1$ many $s-t$ minimum cut computations. Analyze the time complexity of your algorithm. Prove its correctness.
2. **($\star$)** Deign a recursive algorithm to compute a Gomory-Hu tree of a connected undirected weighted graph by computing $n-1$ many $s-t$ minimum cut computations. Analyze the time complexity of your algorithm. Prove its correctness.
3. Prove or disprove: Every connected, undirected, unweighted graph has a unique Gomory-Hu tree.
4. Prove or disprove: if a connected, undirected, weighted graph G has a unique min $s-t$ cut for every pair of vertices s and t, then G has a unique Gomory-Hu tree.
5. Prove or disprove: There exists an algorithm that, given an unweighted graph G, its Gomory-Hu tree T, and an edge e in G, outputs a Gomory-Hu tree of $G \setminus \{e\}$ in $o(n)$ time.
6. Prove or disprove: There exist a connected, undirected, unweighted graph on n vertices that has $2^{\Theta(n)}$ distinct Gomory-Hu trees.