

Important cuts.

1. Let $f : 2^{V(G)} \rightarrow R$ be a submodular function that is symmetric: $f(X) = f(V(G) \setminus X)$ for every $X \subseteq V(G)$. Show that f is posimodular:

$$f(A) + f(B) \geq f(A \setminus B) + f(B \setminus A)$$

holds for every $A, B \subseteq V(G)$.

2. Show that Edge Multiway Cut is polynomial-time solvable on trees.
3. Give a $2^k n^{O(1)}$ time algorithm for Edge Multicut on trees.
4. Reduce Directed Feedback Arc Set to Directed Feedback Vertex Set in polynomial time.
5. Reduce Edge Multiway Cut with $T = 3$ to Directed Edge Multiway Cut with $T = 2$.