CS 0368-4246: Combinatorial Methods in Algorithms (Spring 2025) May 12, 2025

Lecture 7: The Inclusion-Exclusion Principle with Applications

 $Instructor: \ Or \ Zamir$

Homework Questions

- 1. Prove the generalized version of the algorithm from class: Let $f_1, \ldots, f_k : 2^V \to [-M, M]$ be functions from the power set 2^V to integers bounded by M = poly(n). Then, in time $O^*(2^n)$ we can compute the sum of $f_1(V_1) \cdot \ldots \cdot f_k(V_k)$ over all partitions (or covers) $V = V_1 \cup \ldots \cup V_k$.
- 2. Find an algorithm that receives as an input a (possibly weighted) graph, and finds in $O^*(2^n)$ time the maximum k-cut in the graph (i.e., the partition of V to k parts such that the sum of edge weights crossing between different cuts is maximized).