

COS 522: Complexity Theory : Boaz Barak

Handout 3: Probabilistic computation and random walks.

Reading: Chapter 7

probabilistic computation Definition of **BPP** via PTM, certificates.

Examples Primality testing, min cut, polynomial identity testing

Related classes **RP** , **coRP** , **ZPP**.

Error reduction one-sided , two-sided

BPP \subseteq **P**_{/poly}

P = NP implies **BPP = P**

Randomness efficient error reduction expander graphs

Algebraic view of random walks (Normalized) adjacency matrices, probability vector, λ parameter.

Every connected non-bipartite graph has non trivial expansion

Combinatorial (edge) Expansion is roughly equivalent to algebraic expansion

Analysis of error reduction procedure

Homework Assignments

§1 (30 points) Exercise 7.4

§2 (30 points) Exercise 7.8

§3 (30 points) Exercise 7.10

§4 (30 points) Exercise 7.12