

Problem Set 3

Due: Jan. 27, 2012

Note: Please send the solutions to hsun@mpi-inf.mpg.de or sauerwal@mpi-inf.mpg.de before the deadline.

Problem 1 Let G and H be two graphs shown in Figure 1. Calculate

- $\text{Rot}_{G \otimes H}((1, 3), (3, 2));$
- $\text{Rot}_{G \otimes H}((3, 3), (3, 2));$
- $\text{Rot}_{G \otimes H}((6, 4), (1, 1)).$

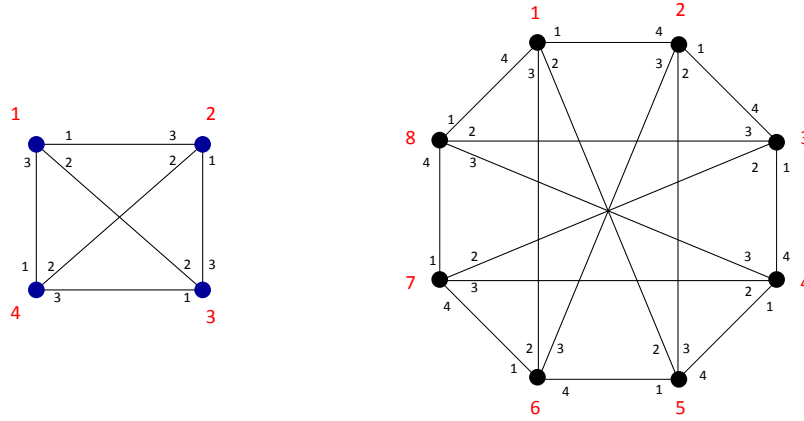


Figure 1: The left graph is H , and the right graph is G .

Problem 2 For any $\varepsilon > 0$, we call $G : \{0, 1\}^m \mapsto (\{0, 1\}^n)^k$ a B -generator with parameter ε if for any sequence $S_1, \dots, S_k \subseteq \{0, 1\}^n$ we have that

$$\left| \Pr \left[\bigwedge_{i=1}^k y_i \in S_i \right] - \prod_{i=1}^k \frac{|S_i|}{2^n} \right| \leq \varepsilon,$$

where y_i is the i th n -bit string produced by G and the probability is taken over a random input to G . Prove that every Nisan's generator is a B -generator with certain parameters m, n, k and ε .