Course outline

How does an NPTEL online course work?

Week 0

Week 1

Week 2

Week 3

Week 4

- Lecture 7: Monotone Circuits
- Lecture 8: Monotone Circuit Lower Bound and Sunflower Lemma.
- Quiz : Assignment 4
- Assignment 4 Solution
- Feedback for Week 4

Week 5

Week 6

Week 7

Week 8

Week 9

Week 10

Week 11

Week 12

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Assignment 4

The due date for submitting this assignment has passed.

Due on 2021-02-17, 23:59 IST.

As per our records you have not submitted this assignment.

1) *1 point*

Recall the monotone Boolean function $\text{Clique}_{k,n} : \{0,1\}^{\binom{n}{2}} \to \{0,1\}$ which on an input graph return 1 if and only if the graph has a k-clique. Consider a n-vertex graph $G_1\,(V_1, E_1)$ such that $\text{Clique}_{k,n}\,(G_1) = 1$ and for a fixed edge $e \in \{0,1\}^{\binom{n}{2}}, e \notin E_1$. Consider a modified graph $G_2\,(V_2, E_2)$ where $V_2 = V_1, E_2 = E_1 \cup e$. Then which of the following option certainly holds true.

- $\text{Clique}_{k,n}(G_2) = 1$
- $\text{Clique}_{k,n}(G_2) = 0$
- $\text{Clique}_{k+1,n}(G_2) = 1$
- There is not enough information to make a relevant deduction.

No, the answer is incorrect.
Score: 0

Accepted Answers:
$\text{Clique}_{k,n}(G_2) = 1$

2) *1 point*

Consider the following two statements.
S1: Union of two NP problems is in NP.
S2: Intersection of two NP-complete problems is necessarily NP-complete.
Choose the appropriate option.

- S1 is true, S2 is true.
- S1 is true, S2 is false.
- S1 is false, S2 is true.
- S1 is false, S2 is false.

No, the answer is incorrect.
Score: 0

Accepted Answers:
S1 is true, S2 is false.

3) *1 point*

Consider the following definitions:

A language $\mathcal{L} \in \{0,1\}^*$ is in complexity class C1, if there exist a polynomial p and TM M such that

$$\forall x \in L \iff \exists u \in \{0,1\}^{p(|x|)} : M\,(x,u) = 1$$

Similarly, a language $\mathcal{L} \in \{0,1\}^*$ is in complexity class C2, if there exist a polynomial p and TM M such that

$$\forall x \in L \iff \forall u \in \{0,1\}^{p(|x|)} : M\,(x,u) = 1$$

Then which of the following options correctly describes complexity class C1 and C2?

- C1=PSPACE and C2=P/poly.
- C1=coNP and C2=NP.
- C1=P/poly and C2=PSPACE.
- C1=NP and C2=coNP.

No, the answer is incorrect.
Score: 0

Accepted Answers:
C1=NP and C2=coNP.