Assignment 9

The due date for submitting this assignment has passed. Due on 2021-03-24, 23:59 IST.

As per our records you have not submitted this assignment.

1) Let $G_1$ be an $n \times n$ matrix with (0,1) entries. We define a bipartite graph $G_2$ on 2n vertices $(x_1, x_2, \ldots, x_n)$ and $(y_1, y_2, \ldots, y_n)$ such that there is an edge between $x_i$ and $y_j$ if and only if $G_1[i][j]$ is 1. Which of the following two statements is/are true?

- (a) $G_1$ has a perfect matching then permanent of $A$ is nonzero.
- (b) $G_1$ has a perfect matching then determinant of $A$ is nonzero.

Score: 0

Accepted Answers:

- Only 1
- Only 2
- Both 1 and 2
- Neither 1 nor 2

2) Let $NP$ be a deterministic interactive protocol that has k rounds of interactions for some k>1. Which of the following is known to be true?

- (a) $NP$ is a strict subset of $D^P$
- (b) $NP$ is equal to $D^P$
- (c) $NP$ is equal to $P$
- (d) $NP$ is not a subset of $D^P$

Score: 0

Accepted Answers:

- $NP$ is a strict subset of $D^P$

3) Let $G_1$ be an $n \times n$ matrix. Which of the following two statements is/are true?

- (a) Determinant of $G$ is nonzero then permanent of $G$ is also nonzero.
- (b) Permanent of $G$ is nonzero then determinant of $G$ is also nonzero.

Score: 0

Accepted Answers:

- Only 1
- Only 2
- Both 1 and 2
- Neither 1 nor 2

4) Consider the following two languages.

- (a) $BPM = \{ d \in \{0,1\}^* | \text{d is an undirected, bipartite graph with } G \text{ has a perfect matching} \}$. BPM is logspace reducible to CYCLO, but CYCLO is not logspace reducible to BPM.
- (b) $CYCLO = \{ d \in \{0,1\}^* | \text{d is a directed graph with } G \text{ has a cycle cover} \}$. Which of the following is known to be true?

- (a) BPM is logspace reducible to CYCLO, but CYCLO is not logspace reducible to BPM.
- (b) BPM is logspace reducible to CYCLO, but CYCLO is not logspace reducible to BPM.
- (c) Both are logspace reducible to each other.
- (d) Neither is logspace reducible to each other.

Score: 0

Accepted Answers:

- Both are logspace reducible to each other

5) Consider the following language.

- (a) $PERMANENCY = \{ A | \text{A is a matrix and the permanent of A is divisible by 2} \}$. Which is the smallest known complexity class among following for Permanency?

- (a) $d^p$
- (b) $NP$
- (c) $NC$

Score: 0

Accepted Answers:

- $NC$

6) We define a class $E^P$ which is same as $NP$ except that the prover in this class is only as powerful as class $E^P$. Which of the following is known to be true?

- (a) $IP$ is a strict subset of $E^P$
- (b) $IP$ is equal to $E^P$
- (c) $E^P$ is a strict subset of $IP$
- (d) $E^P$ is not equal to $IP$

Score: 0

Accepted Answers:

- $IP$ is equal to $E^P$

7) Which of the following is known to be true?

- (a) $IP[1]$ is a strict subset of $BPP$
- (b) $IP[1]$ is equal to $BPP$
- (c) $IP[1] = \text{MOD}_{3}$ where $\text{MOD}_{3}$ is constant
- (d) $IP[1] = \text{BPP}$ where $k = 1$ is constant

Score: 0

Accepted Answers:

- $IP[1]$ is equal to $BPP$

8) Assume that there is a polynomial time algorithm to compute permanent of a matrix. What can we conclude from this?

- (a) $P = NP$
- (b) $NP = coNP$
- (c) $P = \text{PSPACE}$
- (d) $NP = \text{NPSPACE}$

Score: 0

Accepted Answers:

- $P = NP$
- $NP = \text{NPSPACE}$