Assignment 4

Due on 2020-02-05, 23:59 IST.

The deadline for submitting this assignment has passed. Please note that you have not submitted the assignment.

The homework is not graded.

1. The binary number $B35_2$ is equal to
   1. 5
   2. 6
   3. 7
   4. 8

   No, the answer is incorrect.
   Accepted Answers:
   1. 8

2. Which of the following statements are true regarding the diagonal binary numbers $B_A, B_B, B_C$?
   1. $B_A$ is written for or some $0$.
   2. $B_B(100) < 2^{100}$
   3. $B_C(100) < 2^{100}$

   No, the answer is incorrect.
   Accepted Answers:
   1. $B_B(100) < 2^{100}$

3. Which of the following subsets are not such tree subsets?
   1. $(1, 4, 6, 9)$
   2. $(1, 4, 7, 8, 11)$
   3. $(1, 4, 5, 6, 10, 11)$
   4. $(1, 3, 6, 10, 11)$

   Yes, the answer is incorrect.
   Accepted Answers:
   1. $(1, 4, 7, 8, 11)$
   2. $(1, 3, 6, 10, 11)$

4. Which of the following nodes are prime nodes?
   1. $(1, 4, 5, 8, 11)$
   2. $(1, 4, 5, 8, 12)$
   3. $(1, 4, 5, 8, 13)$
   4. $(1, 4, 5, 8, 14)

   Yes, the answer is incorrect.
   Accepted Answers:
   1. $(1, 4, 5, 8, 13)$

5. Let $L_1, L_2, L_3, \ldots, L_n$ be events such that their dependency graph is a $P$-regular graph. Every vertex has degree $k$. We want to show that none of the $L_i$'s occur using Local Lemma (LLL). Let the probability of each of the above mentioned events be less than $\frac{1}{k}$. What conditions would guarantee that we can apply LLL?

   1. $p > \frac{1}{X}$
   2. $p > \frac{1}{X}$
   3. $p > \frac{1}{X}$

   Yes, the answer is incorrect.
   Accepted Answers:
   1. $p > \frac{1}{X}$

6. Which of the following statements are true?

   - Any connected graph on 1000 vertices has a cut of size at least 990.
   - There exist a connected graph on 100 vertices in which the maximum cut is of size 499.
   - Any graph with 1000 edges has a cut of size at least $\frac{1000}{2}$.
   - There exist a connected graph with 1000 edges in which the maximum cut is of size 499.

   Yes, the answer is incorrect.
   Accepted Answers:
   1. Any connected graph on 1000 vertices has a cut of size at least 990.
   2. There exist a connected graph on 100 vertices in which the maximum cut is of size 499.
   3. Any graph with 1000 edges has a cut of size at least 500.
   4. There exist a connected graph with 1000 edges in which the maximum cut is of size 499.

7. Consider 100 events $E_1, E_2, \ldots, E_{100}$ such that the probability of every event is $1/100$. Which of the following methods would be the best to guarantee that none of these events occur?

   - Coin Flipping
   - Lottery Lottery
   - Independence of the $E_i$'s
   - None of the other choices.

   Yes, the answer is incorrect.
   Accepted Answers:
   1. Independence of the $E_i$'s
   2. None of the other choices.

8. Let $G$ be a graph when the degree of every vertex is 7. Assume $n$ is to be sufficiently large. Which of the following statements are true?
   1. $|E(G)| \geq \frac{7n}{2}$
   2. $|E(G)| \geq \frac{7n}{2}$
   3. $|E(G)| \geq \frac{7n}{2}$
   4. $|E(G)| \geq \frac{7n}{2}$

   Yes, the answer is incorrect.
   Accepted Answers:
   1. $|E(G)| \geq \frac{7n}{2}$