Assignment 12

The due date for submitting this assignment has passed. As per our records you have not submitted this assignment.

1. Assuming \( P \) is in \( P \) then which of the following statements is necessarily true?
   - \( P = coRP \)
   - \( coRP \) is a subset of \( P \)
   - \( P = BPP \)
   - None of the above.
   No, the answer is incorrect. Score: 0
   Accepted Answers: None of the above.

2. Let \( f \) and \( g \) be two polynomial of degree of degree \( d \) such that there exists an \( f \) for which, \( f(t) = g(t) \). What can be said about \( f \) and \( g \)?
   - We need one more evaluation to distinguish between \( f \) and \( g \).
   - We need \( d \) more distinct evaluations to distinguish between \( f \) and \( g \).
   - The given information is sufficient to infer \( f = g \).
   - None of the above.
   No, the answer is incorrect. Score: 0
   Accepted Answers: We need \( d \) more distinct evaluations to distinguish between \( f \) and \( g \).

3. Consider a bivariate polynomial \( f(x, y) = \sum_{i=0}^{d} \sum_{j=0}^{d} a_{ij} x^i y^j \) where \( a_{ij} \in \mathbb{Q} \).
   Consider a substitution \( y = x^2 \) such that every bivariate monomials \( x^i y^j \) in \( f \) is mapped to distinct univariate monomial (note that \( x^i y^j \) maps to \( x^{2i+j} \)). What should be the minimum value of \( k \)?
   - 6
   - 5
   - 10
   - Such a map does not exist.
   No, the answer is incorrect. Score: 0
   Accepted Answers: 6

4. Suppose you have black-box access to circuits computing two linear polynomials \( f_1 \) and \( f_2 \) in variables \( x_1, x_2, \ldots, x_n \) with coefficient \( 0 \) or \( 1 \).
   What will be the best time complexity to test if \( f_1 + f_2 \) is identically zero or not?
   - \( O(n) \)
   - \( O(1) \)
   - \( O(n^n) \)
   - \( O(n^2) \)
   No, the answer is incorrect. Score: 0
   Accepted Answers: \( O(n) \)

5. Consider two univariate polynomial \( f_1 \) and \( f_2 \) over \( \mathbb{Z}_2 \) such that:
   - \( f_1 = x^2(x + 1)^2 \)
   - \( f_2 = x^2(x + 2)^2 \)
   Which of the following is a hitting set for \( \{f_1, f_2\} \) over \( \mathbb{Z}_2 \)?
   - \{0, 1\}
   - \{0, 1\}
   - \{0, 1, 2\}
   - \{0\}
   No, the answer is incorrect. Score: 0
   Accepted Answers: \{1, 2\}

6. Consider the polynomial \( f(x) = x^3 - x \) over \( \mathbb{Z}_2 = \{0, 1, 2\} \). Observe that 
   - \( f(0) = f(1) = f(2) = 0 \). Then, which of the following statements for \( f(x) \) is false?
   - \( f(x) \) has infinitely many roots.
   - \( f(x) \) is identically zero.
   - \( f(x) \) is not identically zero.
   - \( f(x) \) is not identically zero.
   No, the answer is incorrect. Score: 0
   Accepted Answers: \( f(x) \) is identically zero.

7. Assuming \( \text{NEXP} \subseteq P/poly \) and \( \text{VP} = \text{VNP} \) which of the following is known to be true?
   - \( P \) is in \( P \)
   - \( P \) is equal to \( \text{NP} \)
   - \( P = \text{BPP} \)
   - \( P \) is not equal to \( \text{NP} \)
   No, the answer is incorrect. Score: 0
   Accepted Answers: \( P \) is in \( P \)