

Questions: Solvable and Unsolvable Problems

1 What is a computational problem?

- A) A task solved using a mathematical equation
- B) A task solved using an algorithm
- C) A task that cannot be solved by any means
- D) A task related to network issues

2 Which of the following is a characteristic of solvable problems?

- A) They require infinite time to solve
- B) They have no algorithmic solution
- C) They can be solved using an algorithm in a finite amount of time
- D) They are only theoretical constructs

3 Which sorting algorithm has a worst-case time complexity of $O(n^2)$?

- A) Quick Sort
- B) Bubble Sort
- C) Merge Sort
- D) Heap Sort

4 What is the time complexity of the Binary Search algorithm?

- A) $O(n)$
- B) $O(n^2)$
- C) $O(\log n)$
- D) $O(n \log n)$

5 Which of the following problems is an example of an unsolvable problem?

- A) Sorting a list of numbers
- B) The Halting Problem
- C) Finding the shortest path in a graph
- D) Multiplying two matrices

6 What does the Halting Problem demonstrate?

- A) That all problems can be solved by algorithms
- B) That some programs will never finish running
- C) That sorting algorithms are efficient
- D) That binary search is the fastest search algorithm

7 What is a Turing Machine?

- A) A type of computer hardware
- B) An abstract machine that can simulate any algorithm's logic
- C) A machine for solving algebraic equations
- D) A physical device used in cryptography

8 What is the Church-Turing Thesis?

- A) A hypothesis that all mathematical problems are solvable
- B) A statement that any function that can be computed algorithmically can be computed by a Turing machine
- C) A theorem proving that some problems are unsolvable
- D) A theory about the efficiency of sorting algorithms

9 What impact do unsolvable problems have on computer science?

- A) They are only of theoretical interest with no practical implications
- B) They help in understanding the limits of computation and influence fields like cryptography
- C) They are irrelevant to modern computing
- D) They are completely avoidable with advanced algorithms

10 Which of the following is a key concept related to unsolvable problems?

- A) The $P=NP$ problem
- B) The concept of Big O notation
- C) Diagonalization method
- D) Quick Sort algorithm

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