Name: _____ **Date:** _____

Circuit Architectures: 12th Grade Algorithmic Blueprints Quiz

Seniors analyze the spatial complexity of Kruskal's algorithm and optimize recursive structures using dynamic programming techniques to solve multifaceted network problems.

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1. A logistical firm utilizes a greedy approach to find the Minimum Spanning Tree (MST) of a city's fiber-optic grid. Which algorithm is most likely being applied if the process involves sorting all edges by weight and adding them only if they do not create a cycle?

A. Dijkstra's Algorithm
B. Kruskal's Algorithm
C. Bellman-Ford Algorithm
D. Floyd-Warshall Algorithm

2. When refactoring a recursive solution for the 'Longest Common Subsequence' problem to avoid redundant calculations, a developer uses a table to store results of subproblems. This technique is known as _____.

A. Backtracking
B. Linear Probing
C. Memoization
D. Heuristic Search

3. In Big O notation, an algorithm with a time complexity of O(2^n) is considered more efficient for large datasets than one with O(n^3).

A. True
B. False

4. Imagine you are designing a GPS system for a delivery drone that must calculate the shortest path in a graph where some edges might have negative weights (representing energy regeneration). Which algorithm would be most appropriate?

A. A* Search
B. Breadth-First Search
C. Dijkstra's Algorithm
D. Bellman-Ford Algorithm

5. Which specific data structure is essential for implementing a Breadth-First Search (BFS) to ensure the shortest path is found in an unweighted graph?

A. Stack (LIFO)
B. Queue (FIFO)
C. Max-Heap
D. Binary Search Tree

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6. A developer is optimizing a social media 'friend recommendation' engine. They decide to use a _____ to represent the network, where individuals are nodes and friendships are edges.

A. Adjacency Matrix
B. Linked List
C. Hash Map
D. Priority Queue

7. P vs NP is a major unsolved problem in computer science where P represents problems solvable in polynomial time and NP represents problems whose solutions can be verified in polynomial time.

A. True
B. False

8. In the context of the Knapsack Problem, which approach guarantees the globally optimal solution for the '0/1' version (where items cannot be split)?

A. Greedy approach based on value
B. Greedy approach based on weight
C. Dynamic Programming
D. Linear Search

9. When an algorithm solves a problem by using a 'divide and conquer' strategy, it splits the problem into smaller parts, solves them, and then uses a _____ step to combine the results.

A. Parsing
B. Merging
C. Hasing
D. Encoding

10. An 'in-place' sorting algorithm is one that requires O(n) additional memory space beyond the input array to execute.

A. True
B. False