1. What is dynamic programming primarily used for?
   1. Sorting
   2. Searching
   3. **Optimization**
   4. Encryption
2. Dynamic programming is applicable to problems that exhibit which of the following properties?
   1. **Overlapping subproblems**
   2. Large input size
   3. Linear time complexity
   4. Simple recursive structure
3. In dynamic programming, what does "bottom-up" approach mean?
   1. Solving the problem from the bottom to the top
   2. **Solving the problem iteratively, starting with the base case**
   3. Solving the problem recursively
   4. Solving the problem using a stack data structure
4. Which dynamic programming pattern is used to solve problems by breaking them down into smaller subproblems and storing their solutions?
   1. Top-down
   2. **Bottom-up**
   3. Divide and conquer
   4. Greedy
5. What is the time complexity of the Fibonacci sequence calculation using dynamic programming?
   1. O(1)
   2. **O(n)**
   3. O(log n)
   4. O(n^2)
6. Which dynamic programming pattern is used when the problem can be divided into two or more overlapping subproblems?
   1. **Memoization**
   2. Tabulation
   3. Greedy
   4. Divide and conquer
7. Which dynamic programming technique is used to store intermediate results in a cache to avoid redundant calculations?
   1. **Tabulation**
   2. Greedy
   3. Divide and conquer
   4. Bottom-up
8. The 0/1 Knapsack problem is an example of which dynamic programming pattern?
   1. Top-down
   2. **Bottom-up**
   3. Memoization
   4. Greedy
9. Which dynamic programming pattern is often used to optimize recursive algorithms?
   1. **Top-down**
   2. Bottom-up
   3. Divide and conquer
   4. Tabulation
10. Which dynamic programming pattern is more space-efficient as it uses recursion and only stores necessary results?
    1. **Top-down**
    2. Bottom-up
    3. Divide and conquer
    4. Tabulation
11. What is the time complexity of solving problems using dynamic programming with memoization?
    1. **O(n)**
    2. O(n^2)
    3. O(2^n)
    4. O(log n)
12. The Longest Common Subsequence (LCS) problem is typically solved using which dynamic programming pattern?
    1. Top-down
    2. **Bottom-up**
    3. Divide and conquer
    4. Memoization
13. Which dynamic programming pattern is more efficient when solving problems with overlapping subproblems?
    1. Top-down
    2. **Bottom-up**
    3. Divide and conquer
    4. Tabulation
14. What does the "Optimal Substructure" property mean in dynamic programming?
    1. It describes problems that have a single solution.
    2. **It states that the global optimal solution can be constructed from optimal solutions of subproblems.**
    3. It indicates problems with no overlapping subproblems.
    4. It refers to the order in which subproblems are solved.
15. Which dynamic programming pattern is generally preferred when solving problems using recursion?
    1. **Top-down**
    2. Bottom-up
    3. Divide and conquer
    4. Tabulation
16. What is the time complexity of solving the Longest Increasing Subsequence (LIS) problem using dynamic programming?
    1. O(n)
    2. **O(n^2)**
    3. O(log n)
    4. O(n log n)
17. In dynamic programming, what is the purpose of storing solutions to subproblems?
    1. **To reduce the time complexity**
    2. To increase the space complexity
    3. To make the code shorter
    4. To avoid using recursion
18. Which dynamic programming pattern typically uses recursion with a memoization table?
    1. Bottom-up
    2. **Top-down**
    3. Divide and conquer
    4. Tabulation
19. The Coin Change problem is an example of which type of dynamic programming problem?
    1. **Optimization**
    2. Non-overlapping subproblems
    3. Non-recursive
    4. Greedy
20. Which dynamic programming pattern is based on the idea of solving problems by solving smaller subproblems first?
    1. Top-down
    2. **Bottom-up**
    3. Divide and conquer
    4. Tabulation
21. What is the primary advantage of using dynamic programming over a naive recursive approach?
    1. **Faster execution**
    2. Smaller code
    3. Easier implementation
    4. Higher memory efficiency
22. Which of the following is NOT a common dynamic programming optimization technique?
    1. Top-down approach
    2. Bottom-up approach
    3. Memoization
    4. **Linear search**
23. Dynamic programming can be applied to problems with which type of time complexity?
    1. O(1)
    2. O(n)
    3. O(log n)
    4. **O(n^2)**
24. In dynamic programming, what is the primary goal when optimizing a recursive algorithm?
    1. Reducing space complexity
    2. Improving code readability
    3. Minimizing the number of function calls
    4. **Decreasing time complexity**
25. Which of the following is an example of a problem that can be solved using the Knapsack dynamic programming pattern?
    1. Finding the shortest path in a graph
    2. Sorting an array of integers
    3. **Selecting items to maximize value within a weight constraint**
    4. Calculating the factorial of a number
26. The Fibonacci sequence can be calculated efficiently using which dynamic programming pattern?
    1. Top-down
    2. **Bottom-up**
    3. Memoization
    4. Divide and conquer
27. What is the primary purpose of memoization in dynamic programming?
    1. To improve code readability
    2. To reduce the need for recursion
    3. **To store solutions to subproblems and avoid redundant calculations**
    4. To minimize the space complexity
28. In the context of dynamic programming, what is the "state" of a problem?
    1. **The input parameters and variables used in the recursive function**
    2. The final output of the algorithm
    3. The time complexity of the algorithm
    4. The size of the problem instance
29. The Traveling Salesman Problem (TSP) can be solved using which dynamic programming pattern?
    1. Bottom-up
    2. **Top-down**
    3. Divide and conquer
    4. Greedy
30. Which dynamic programming pattern is typically more efficient in terms of time complexity?
    1. Top-down
    2. **Bottom-up**
    3. They have the same time complexity
    4. It depends on the problem
31. What is the primary disadvantage of using dynamic programming to solve problems?
    1. It is often difficult to implement.
    2. **It requires a lot of memory.**
    3. It may not work for all types of problems.
    4. It is slower than brute force methods.
32. Which of the following problems can be efficiently solved using dynamic programming?
    1. Sorting a large array of integers
    2. Finding the maximum element in an array
    3. Calculating the factorial of a number
    4. **Finding the shortest path in a graph**
33. In dynamic programming, what does the "tabulation" approach involve?
    1. Storing intermediate results in a cache
    2. **Solving the problem iteratively from the bottom up**
    3. Using recursion to solve subproblems
    4. Solving the problem using a stack data structure
34. Which dynamic programming pattern typically uses an array or table to store solutions to subproblems?
    1. Memoization
    2. **Tabulation**
    3. Top-down
    4. Divide and conquer
35. What is the primary advantage of using memoization in dynamic programming?
    1. Improved code readability
    2. Reduced space complexity
    3. Faster execution
    4. **Avoiding redundant calculations**