Unit 1 Quiz

1. What is an algorithm?

   a) A mathematical equation

   b) A step-by-step procedure for solving a problem

   c) A programming language

   d) A data structure

2. Which of the following is NOT a commonly used rate of growth in algorithm analysis?

   a) Linear

   b) Exponential

   c) Quadratic

   d) Circular

3. What is the purpose of Asymptotic Notations in algorithm analysis?

   a) To precisely measure the running time of an algorithm

   b) To approximate the running time of an algorithm

   c) To ignore constant factors and lower-order terms

   d) To analyze only the worst-case scenario of an algorithm

4. Which theorem is used for analyzing the running time of algorithms with recursive functions?

   a) Central Limit Theorem

   b) Master Theorem

   c) Pythagorean Theorem

d) Fermat's Little Theorem

5. Which searching algorithm is suitable for a sorted array?

a) Linear search

b) Binary search

c) Depth-first search

d) Breadth-first search

6. Which searching algorithm has a time complexity of O(log n)?

a) Linear search

b) Binary search

c) Depth-first search

d) Breadth-first search

7. What is the time complexity of linear search in the worst-case scenario?

a) O(1)

b) O(log n)

c) O(n)

d) O(n^2)

8. What is the time complexity of binary search in the worst-case scenario?

a) O(1)

b) O(log n)

c) O(n)

d) O(n^2)

9. How many pegs are used in the standard Tower of Hanoi problem?

a) 1

b) 2

c) 3

d) 4

10. Which type of recursion is commonly used to solve the Tower of Hanoi problem?

a) Linear recursion

b) Tail recursion

c) Tree recursion

d) Mutual recursion

11. What is the base case of the Tower of Hanoi problem?

a) When there are no disks left to move

b) When there is four disk left to move

c) When there are two disks left to move

d) When there are three disks left to move

12. Which sequence is generated by the Fibonacci series?

a) 1, 1, 2, 3, 5, 8, ...

b) 0, 1, 1, 2, 3, 5, ...

c) 2, 4, 6, 8, 10, ...

d) 1, 2, 4, 8, 16, ...

13. What is the time complexity of the iterative binary search algorithm?

a) O(1)

b) O(log n)

c) O(n)

d) O(n^2)

14. What is the time complexity of the recursive binary search algorithm?

a) O(1)

b) O(log n)

c) O(n)

d) O(n^2)

15. Which of the following is NOT a type of analysis commonly used in algorithm design?

a) Worst-case analysis

b) Average-case analysis

c) Best-case analysis

d) Median-case analysis

16. Which notation is used to describe the upper bound of an algorithm's running time?

a) O-notation

b) Ω-notation

c) Θ-notation

d) o-notation

17. Which of the following is NOT a step in the design and analysis of algorithms?

a) Problem identification

b) Algorithm implementation

c) Algorithm optimization

d) Algorithm analysis

18. Which of the following is an example of a recursive algorithm?

a) Linear search

b) Binary search

c) Factorial calculation

d) Bubble sort

19. What is the time complexity of the Tower of Hanoi problem with n disks?

a) O(1)

b) O(log n)

c) O(n)

d) O(2^n)

20. Which of the following is a characteristic of a well-designed algorithm?

a) High space complexity

b) High time complexity

c) Low space complexity

d) Low time complexity

21. What is the primary goal of the Master theorem?

a) To find the optimal algorithm for a given problem

b) To determine the time complexity of recursive algorithms

c) To solve mathematical equations

d) To analyze the efficiency of sorting algorithms

22. Which searching algorithm has a time complexity of O(n) in the worst-case scenario?

a) Linear search

b) Binary search

c) Depth-first search

d) Breadth-first search

23. Which of the following is NOT a commonly used asymptotic notation?

a) Θ-notation

b) Ω-notation

c) ε-notation

d) o-notation

24. Which of the following algorithms is based on a divide-and-conquer strategy?

a) Linear search

b) Binary search

c) Bubble sort

d) Insertion sort

25. What is the purpose of analyzing the time complexity of algorithms?

a) To determine the best programming language for implementation

b) To compare the efficiency of different algorithms

c) To minimize the use of memory

d) To simplify the implementation process

26. Which of the following statements about asymptotic notations is true?

a) They precisely measure the exact running time of an algorithm

b) They ignore the constants and lower-order terms in the running time equation

c) They are only applicable to recursive algorithms

d) They are used to analyze space complexity, not time complexity

27. Which of the following algorithms is NOT used for searching?

a) Linear search

b) Binary search

c) Merge sort

d) Depth-first search

28. What is the time complexity of the Tower of Hanoi problem with n disks?

a) O(1)

b) O(n)

c) O(log n)

d) O(2^n)

29. Which of the following is a characteristic of an efficient algorithm?

a) High time complexity

b) Low space complexity

c) High space complexity

d) Low time and space complexity

30. What is the purpose of analyzing the time complexity of algorithms?

a) To determine the best programming language for implementation

b) To compare the efficiency of different algorithms

c) To minimize the use of memory

d) To simplify the implementation process