CS502 – Fundamental of Algorithms

Quiz # 1 January 2021

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If found any error please correct it accordingly

1. DFS or BFS yields a _____ of the graph.
   a. Traversed Tree
   b. Spanning tree page 125
   c. Simple Tree
   d. Free Tree
2. In Knapsack Problem, the goal is to put items in the knapsack such that the value of the items is _____ subject to weight limit of knapsack.
   a. Minimized
   b. Decreased
   c. Maximized page 91
   d. None of the given options
3. Using ASCII code, each character is represented by a fixed-length code of _____ bits per character.
   a. 4
   b. 6
   c. 8 page 99
   d. 10
4. Which type of algorithm is harder to prove the correctness?
   a. Greedy google
   b. Brute Force
   c. Dynamic Programming
   d. Divide and Conquer
5. Consider the string "abcdaacac". if the string is coded with ASCII codes, the message length would be _____.
   a. 70 bits
   b. 60 bits
   c. 90 bits
   d. 75 bits 8*9=72 bits is the right answer
6. In _____ algorithm, you hope that by choosing a local optimum at each step, you will end up at a global optimum.
   a. Simple
   b. Divide and conquer
   c. Greedy page 97
   d. Brute force

7. For a digraph G = (V, E), Sum of in-degree(v) _____
    a. Not equal to Sum of out-degree(V)
    b. = Sum of out-degree(v) page 115
    c. < Sum of out-degree(v)
    d. > Sum of out-degree(v)
8. In inductive approach of knapsack problem, we consider 2 cases, _____ Or _____.
    a. Median, Mode
    b. Recursive, Iterative
    c. Leave object, Take object page 93
    d. Sequentially, Parallel
9. A/an _____ is one in which you want to find, not just a solution, but the best solution.
    a. Optimization Problem page 97
    b. Divide and Conquer
    c. NP Complete problem
    d. Best Problem
10. If the graph is represented using an **adjacency matrix,** then **Breadth-first search** takes _____ time.
    a. O(E+1)
    b. O(V^2) page 125
    c. O(V)
    d. O(E)
11. If the graph is represented using an **adjacency list**, then **Breadth-first search** takes _____ time.
    a. O(V^2)
    b. O(V)
    c. O(V + E) google
    d. O(E + 1)
12. A graph is _____ if every vertex can reach every other vertex
    a. Connected page 116
    b. Cycle
    c. Acyclic
    d. Loop
13. The number of edges that come out of a vertex is called the _____ of that vertex in a digraph.
    a. post-degree
    b. in-degree
    c. out-degree page 114
    d. pre-degree

14. Huffman algorithm produces the _____ prefix code tree
    a. **Optimal page 105**
    b. Best
    c. Worst
    d. Better
15. A graph is said to be acyclic if it contains _____
    a. at least one cycle
    b. exactly one cycle
    c. always more than one cycle
    d. **no cycles page 116**
16. Fractional Knapsack is founded on _____ method.
    a. Greedy
    b. Recursive
    c. **Dynamic Programming google and page 93**
    d. Divide and Conquer
17. If Matrix-A has dimensions "3x2" and Matrix-B has dimensions "2x3", then multiplication of Matrix-A and Matrix-B will result a new Matrix-C having dimensions
    a. 3x2
    b. 2x3
    c. 2x2
    d. **3x3**
18. Some places a person wants to visit Starting from a vertex, he wants to visit every place linked to this vertex, and so on. What algorithm does he need to use?
    a. Depth First Search
    b. **Breadth First Search page 118**
    c. Greedy Algorithm
    d. Divide and Conquer
19. A Greedy algorithm can NOT be used to solve all the _____ problems.
    a. **Dynamic programming google**
    b. Memorization programming
    c. Edit distance programming
    d. Storing value programing
20. In Huffman encoding, the _____ is the number of occurrences of a character divided by the total characters in the message.
    a. Counting
    b. Parsing
    c. **Relative Probability page 100**
    d. Weight

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21. In Brute Force solution of knapsack Problem, there are _____ possible combinations for n items.
    a. 2
    b. n
    c. 2^n (2 raise to the power n) Page 92
    d. 3^n (3 raise to the power n)

22. The Binary Tree constructed by Huffman Encoding is a:
    a. Full binary tree page 102
    b. Partial binary tree
    c. Incomplete binary tree
    d. None of the given options

23. In Huffman encoding when a new node is created by combining two nodes, the new node is placed in the _____.
    a. Priority queue page 100
    b. Linked list
    c. Min heap tree
    d. Graph traversal

24. Find the maximum value of the items which can carry using knapsack weight capacity = 50.

Item	Weight	Value
1	10	70
2	20	20
3	30	80
4	70	200

    a. 280
    b. 100 30+20=50, so v=100
    c. 90
    d. 200

25. In general, the Activity Selection Problem is to select a _____.
    a. Minimum-size set of interfering activities
    b. Maximum-size set of mutually non-interfering activities page 105
    c. Maximum-size set of interfering activities
    d. Minimum-size set of mutually non-interfering activities

26. In Activity selection problem, intuitively _____.
    a. There are always short activities as input
    b. Short activities are not attractive
    c. Duration of the activities does not matter
    d. We do not like long activities page 105

27. Which of the following ways can be used to represent a graph?
    a. Adjacency List
    b. Incidence Matrix
    c. Adjacency Matrix Adjacency List
    d. No way to represent
28. Which of the following algorithms solves the fractional knapsack problem most effectively?
    a. Divide and conquer
    b. Greedy algorithm page 109 / google
    c. Dynamic programming
    d. Backtracking
29. The prefix code generated by Huffman algorithm _____ the expected length of the encoded string.
    a. Minimizes page 102
    b. Balances
    c. Maximizes
    d. Keeps Constant
30. In context of activity selection algorithm, time is dominated by sorting of the activities by _____.
    a. Start Times
    b. Finish Times page 106
    c. Average Times
    d. CPU Burst Times
31. Huffman algorithm generates an optimum _____ code.
    a. Prefix page 102
    b. Postfix
    c. Infix
    d. None of the given options
32. If a matrix has three rows and two columns, then dimensions of matrix will be:
    a. 3 x 2
    b. 2 x 3
    c. 3 x 3
    d. 2 x 2
33. In greedy algorithm, at each phase, you take the _____ you can get right now, without regard for future consequences.
    a. Worst
    b. Minimum
    c. Good
    d. Best page 97

34. Which of the following algorithms provides an optimal solution for the activity selection problem?
    a. Divide and Conquer
    b. Brute Force
    c. Greedy page 105
    d. Recursive

35. Suppose you are given infinite coins of 1, 2, 3, and 4. Select the ways of the minimum number of coins that required to achieve a sum of 6:
    a. 1
    b. 2 (4+2=6)
    c. 3
    d. 4

36. Using ASCII standard the string "greedy" will be encoded with
    a. 48 bits 8n=8(6)=48 bits ascii encode
    b. 120 bits
    c. 44 bits
    d. 40 bits

37. For graph traversal, Breadth-first search strategy _____
    a. is always recursive page 117 / and google
    b. Cannot be recursive
    c. Cannot be non-recursive
    d. Can be both recursive and non-recursive

38. The greedy approach gives us an optimal solution when the coins are all powers of a _____ denomination.
    a. Fixed page 98
    b. Variable
    c. Constant
    d. Static

39. In Activity Selection, we say that two activities are non-interfering if their start-finish interval _____ overlap.
    a. Do
    b. Do not page 105
    c. Sometimes
    d. Once

40. Bag is a _____.
    a. type of algorithm
    b. data structure google
    c. program
    d. compiler

41. The running time of brute-force algorithm to solve Knapsack problem is _____.
    a. O(n)
    b. O(n3)
    c. O(n!)
    d. O(2^n) page 92

42. In Activity scheduling algorithm, the width of a rectangle _____.
    a. Is always ignored
    b. Directs towards recursion
    c. Should be maximized
    d. Indicates the duration of an activity page 106

43. In a digraph, the number of edges coming out of a vertex is called the _____ of that vertex.
    a. In-degree
    b. Complete degree
    c. Node
    d. Out-degree page 114

44. How many steps are involved to design the dynamic programming strategy?
    a. 2 page 75
    b. 3
    c. 1
    d. 4

45. The Huffman codes provide a method of _____ data efficiently.
    a. Reading/Writing
    b. Encoding/Decoding page 99
    c. Divide/Conquer
    d. Inserting/Deleting

46. Time complexity of the "0 - 1" knapsack algorithm depends on _____.
    a. Number of items
    b. Capacity of the knapsack
    c. Size of the table
    d. Number of items and capacity of knapsack page 91/92 & google

47. If the string "lmncde" is coded with ASCII code, the message length would be _____ bits.
    a. 24
    b. 36
    c. 48 8*6=48
    d. 60

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48. Each time we traverse graph by Breadth-first search algorithm, we count the distance from _____.
    a. Starting node page 117
    b. neighbors of the starting node
    c. right most node
    d. Left most node

49. The coin change problem is to find the minimum number of coins required to get the sum S of infinite coins of denominations al, a2, a3,...., an. This problem can be solved using _____.
    a. Greedy algorithm
    b. Dynamic programming page 98
    c. Divide and conquer
    d. Backtracking

50. Each vertex can reach every other vertex is called _____.
    a. Unordered graph
    b. Unconnected graph
    c. Connected graph page 116
    d. Ordered graph

51. _____ data structure is used to perform the Depth-first search.
    a. Array
    b. Queue
    c. Stack page 120
    d. Tree

52. In general, a graph G = (V, E) consists of a _____ and E, a binary relation on V called edges.
    a. Infinite set of vertices V
    b. Infinite set of nodes
    c. Finite set of vertices V page 113
    d. Infinite set of objects

53. The general coin change problem can be solved using _____.
    a. Dynamic programming page 98
    b. Greedy Algorithm
    c. Divide and Conquer
    d. Recursion

54. For traversing the graphs, _____ can be visualized as a wave front propagating inward towards root node.
    a. Depth-first Search
    b. Breadth-first search
    c. Binary search
    d. Linear search

55. Counting Money problem:
    a. Can be optimally solved by greedy algorithm
    b. cannot be optimally solved by greedy algorithm
    c. Cannot be solved by brute force algorithm
    d. Can be solved by simple recursive algorithm
56. The activity scheduling is a simple scheduling problem for which the greedy algorithm approach provides a/an _____ solution.
    a. Simple
    b. Sub optimal
    c. Optimal page 105
    d. Non optimal
57. Which of the following is true about Huffman Coding?
    a. Huffman Codes may not be optimal lossless codes in some cases
    b. Huffman coding may become Lossy in some cases
    c. Huffman coding is not an efficient coding way
    d. In Huffman coding, no code is prefix of any other code google
58. One of the limitation in 0/1 knapsack is that an item can either be _____ in the bag or not.
    a. Use
    b. Put page 91
    c. Move
    d. Store
59. In _____ involves breaking up the problem into sub problems whose solutions can be combined to solve the global problem.
    a. Complexity Theory
    b. Dynamic programming solution page 86
    c. Divide and Conquer Strategy
    d. Greedy Algorithms
60. The time complexity of activity selection algorithm is _____.
    a. O(NlogN)
    b. O(N)
    c. O(logN)
    d. O(NlogN) page 106
61. The _____ is a problem for which the greedy algorithm approach provides an optimal solution.
    a. Activity selection page 105
    b. Dynamic programming
    c. Knapsack Problem
    d. NP complete problem

62. Which of the following is true about graph?
    a. A graph may contain no edges and many vertices
    b. A graph may contain many edges and no vertices
    google
    c. A graph may contain no edges and no vertices
    d. A graph may contain no vertices and many edges

63. In Huffman encoding fixed-length codes are popular because it is very easy to break up a _____ into its individual _____.
    a. Number, string
    b. Character, Number
    c. String, Characters page 99
    d. Floating number, string

64. In general in comparison with Fractional Knapsack problem, _____
    a. 0 – 1 knapsack problem is very easy to solve
    b. 0 – 1 knapsack problem is hard to solve page 109
    c. Both are easy to solve
    d. We cannot compare them

65. In an undirected graph, we say that an edge is _____ on a vertex if the vertex is an endpoint of the edge.
    a. Incident page 114
    b. Directed
    c. Undirected
    d. Tree

66. In Huffman Encoding, the characters with smallest probabilities are placed at the _____ depth of the tree
    a. Minimum
    b. Average
    c. Maximum page 102
    d. Root

67. The probability in Huffman encoding is the number of occurrences of a character divided by the total _____ in the message
    a. Numbers
    b. Frequencies
    c. Strings
    d. Characters page 100

68. The Knapsack problem belongs to the domain of _____ problems
    a. Optimization page 91
    b. Sorting
    c. Linear solution
    d. Searching

69. In recursive formulation of Knapsack Problem:
V[0, j] = _____ for j>=0
    a. -1
    b. 0 page 93
    c. 1
    d. 2

70. An optimization problem is one in which you want to find the _____ solution
    a. Simple
    b. Good
    c. Best page 97
    d. Worst

71. If we implement the bag by using a queue, we have _____.
    a. BFS page 124
    b. DFS
    c. Graph
    d. Loop

72. Which graph traversal algorithm uses a stack to keep track of vertices?
    a. Divide and Conquer
    b. Breadth First Search
    c. Greedy Algorithm
    d. Depth First Search page 120

73. In Dynamic Programming based solution of Knapsack Problem, if we decide to take an object 'i', then we gain _____.
    a. W (Total Weight of Knapsack)
    b. V (Total Value of all items)
    c. vi (Value of object i) page 93
    d. None of the given option

74. If there are no cycles in the graph, what is the maximum number of edges present in a simple directed graph with 5 vertices?
    a. 3
    b. 4
    c. 5
    d. 6

75. The algorithm can be visualized as a wave front propagating outwards from s visiting the _____ in bands at ever increasing distances from s.
    a. Vertices page 117
    b. Node
    c. Tree
    d. Graph

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76._____ Items are not allowed in 0/1 Knapsack problem.

a. 0
b. 1
c. 0/1
d. Fractional page 91

77.There are _____ ways of representing graphs.

a. 3
b. 1
c. 2 page 116
d. 4

78.Queue data structure work on _____ principles.

a. FIFO (first in, first out)
b. LIFO (last in, first out)
c. JLO (just in, last out)
d. LOFI (last out, first in)

79.Graphs can be represented by an _____ and _____.

a. Queue, Stack
b. adjacency list, adjacency Matrixpage 116
c. Binary, Linear
d. adjacency Right, adjacency Left

80.If the graph is represented using an **adjacency list**, then **Depth-first search** takes _____ time.

a. O(V)
b. O(E + 1)
c. O(V^2)
d. O(V + E) page 124 and google

81.In Fractional Knapsack problem the goal is to _____

a. minimize the value of items without exceeding the total weight limit of W
b. maximize the value of items without exceeding the total weight limit of W page 109
c. minimize the value of items even if exceeding the total weight limit of W
d. maximize the value of items even if exceeding the total weight limit of W

82.Brute-force is a simple strategy for computing _____.

a. Shortest path page 117
b. Longest path
c. Easiest path
d. Complete path

83. In a digraph, the number of edges coming in of a vertex is called the _____ of that vertex.
    a. Out-degree
    b. In-degree page 114
    c. Complete degree
    d. Node

84. Time complexity of Dynamic Programming based algorithm for computing the minimum cost of Chain Matrix Multiplication is _____.
    a. log n
    b. n
    c. n^2 (n square)
    d. n^3 (n cube) page 90

85. If the graph is represented using an **adjacency matrix**, then **Depth-first search** takes _____ time.
    a. O(V^2) google
    b. O(V)
    c. O(E + 1)
    d. O(V + E)

86. _____ Items are not allowed in the 0/1 Knapsack.
    a. Lighter
    b. Fractional page 91
    c. Whole
    d. Weighty

87. In Knapsack Problem, each item must be entirely accepted or rejected, is called _____ problem
    a. Fractional
    b. 0-1 page 92
    c. Linear
    d. Optimal

88. Breadth-first search is a traversal strategy for _____.
    a. Graph page 119
    b. Tree
    c. Array
    d. Link List

89. A _____ cycle is a cycle that visits every edge of the graph exactly once.
    a. Eulerian page 115
    b. Directed
    c. Undirected
    d. Loop

90. In Activity scheduling algorithm, each activity is represented by a _____

a. Circle
b. Square
c. Triangle
d. Rectangle page 106

91. Graphs are important _____ model for many application problems.

a. Unsystematic
b. Mathematical page 113
c. Haphazard
d. Unpredictable

92. In Fractional Knapsack problem, one is allowed to take fraction of an item for _____.

a. for fraction of the weight
b. for fraction of the value
c. Both fraction of the weight and value page 109
d. None of the given options

93. Traversing a graph means visiting _____ in the graph.

a. no node
b. at least one
c. more than one node
d. every node page 119

94. A _____ w is adjacent to vertex v if there is an edge from v to w.

a. Vertex page 113
b. cycle
c. loop
d. acyclic

95. _____ is a good way to model some sort of "connection" or "relationship" or "interaction" between pairs of objects taken from a set of objects.

a. Tree
b. Graph page 113
c. Node
d. Vertices

96. Which of the following algorithms is the best approach for solving Huffman codes?

a. Exhaustive search
b. Greedy algorithm google
c. Brute force algorithm
d. Divide/conquer algorithm

97. Those problems in which Greedy finds good, but not always best is called a greedy _____.
    a. Algorithm
    b. Solution
    c. Heuristic page 97
    d. Result
98. The running time of the traversal algorithm depends on _____ and _____ which is used for the bag.
    a. Graph representation. Data structure page 120
    b. Parent Node, Child Node
    c. Edges. Vertices
    d. Root Leaf
99. Which of the following problems is NOT solved using dynamic programming?
    a. Fractional knapsack problem google
    b. 0/1 knapsack problem
    c. Edit distance problem
    d. Matrix chain multiplication problem
100. In Dynamic Programming based solution of knapsack problem, to compute entries of 'V', we will imply a(n) _____ approach.
    a. Subjective
    b. Inductive page 93
    c. Brute Force
    d. Combination
101. Time complexity of activity selection algorithm is _____.
    a. O(N)
    b. O(NlogN) page 106
    c. O(logN)
    d. O(logN2)
102. Identify a TRUE statement about knapsack.
    a. The knapsack problem does not belong to the domain of optimization problems,
    b. The knapsack problem belongs to the domain of optimization problems. Page 92
    c. The knapsack problem cannot be solved by using dynamic programming
    d. The knapsack problem is optimally solved by using brute force algorithm

103. Huffman algorithm uses a _____ to generate a prefix code T that minimizes the expected length B(T) of the encoded string

a. Dynamic Programming
b. Heuristic Approach
c. Greedy Approach page 102
d. Null Approach

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