Started on	Saturday, 31 October 2020, 11:00 AM
State	Finished
Completed on	Saturday, 31 October 2020, 11:30 AM
Time taken	29 mins 35 secs
Grade	**6.00** out of 20.00 (**30**%)

Question **1**

Correct

Mark 1.00 out of 1.00

The probability of the six letters **p,q,r,s,t,u** in a file is 1/32, 1/32, 1/16, 1/8, 1/4 and 1/2 respectively. Out of the following codes, which is a possible Huffman coding for the letters?

Select one or more:

- [ ] 0000, 0001,001,01,10,11
- [x] 00000, 00001, 0001, 001, 01, 1 ✔
- [x] 11111, 11110, 1110, 110, 10, 0 ✔
- [ ] 000, 001, 010, 011, 10, 11

Your answer is correct.

The correct answers are: 11111, 11110, 1110, 110, 10, 0, 00000, 00001, 0001, 001, 01, 1

Question **2**

Incorrect

Mark 0.00 out of 1.00

What is the output (the maximum value that can be picked) of the Knapsack problem on the following input?

V	12	10	20	16
W	5	3	8	6

The values and weights of the four items are given in the **V** and **W** arrays above (item i has value V[i] and weight W[i]). Total capacity of the knapsack is 12 units. You can only pick the entire item, not fractions of it.

Select one or more:

- [x] 26 ✖
- [ ] None of the others
- [ ] 28
- [ ] 32
- [ ] 36

Your answer is incorrect.

The correct answer is: 28

Question **3**

Correct

Mark 2.00 out of 2.00

Suppose $S(n)$ represents the total number of possible binary strings of length n which have two successive 1s. Then which of the following is true?

Select one or more:

- ☐ $S(n) = 2^{n-2} + 2S(n-1) + S(n-2)$
- ☑ $S(n) = 2^{n-2} + S(n-1) + S(n-2)$ ✔
- ☐ $S(n) = 2^{n-2} + S(n-1) + 2S(n-2)$
- ☐ $S(n) = 2^{n-2} + 2S(n-1) + 2S(n-2)$
- ☐ None of the others

Your answer is correct.

The correct answer is: $S(n) = 2^{n-2} + S(n-1) + S(n-2)$

Question **4**

Incorrect

Mark 0.00 out of 1.00

Which of the following statements is True about the Bellman-Ford algorithm?

Select one or more:

- ☑ It always find if a negative weighted cycle is reachable from the source ✔
- ☑ None of the others ✖
- ☐ It always finds any cycle in the graph
- ☐ It always finds if a negative weighted cycle exists

Your answer is incorrect.

The correct answer is: It always find if a negative weighted cycle is reachable from the source

Question **5**

Incorrect

Mark 0.00 out of 1.00

Which of the following statements is True about the Floyd-Warshall algorithm?

Select one or more:

- [ ] The runtime is $O(VE)$
- [x] The runtime is $O(V^3)$ ✔
- [x] The algorithm can only detect negative weight cycles reachable from the source ✖
- [ ] The algorithm can not detect negative weight cycles

Your answer is incorrect.

The correct answer is: The runtime is $O(V^3)$

Question **6**

Incorrect

Mark 0.00 out of 2.00

What is the output (the maximum value that can be picked) of the Knapsack problem on the following input?

V	10	10	21	15
W	5	3	7	6

The values and weights of the four items are given in the **V** and **W** arrays above (item i has value V[i] and weight W[i]). Total capacity of the knapsack is 12 units. You are allowed to pick fractions of the above items.

Select one or more:

- [ ] 48
- [ ] 24
- [x] None of the others ✖
- [x] 32 ✖
- [ ] 36

Your answer is incorrect.

The correct answer is: 36

Question **7**

Correct

Mark 1.00 out of 1.00

Given strings P = "vuvww" and B = "uvuwvwu". If the length of the longest common subsequence (not necessarily contiguous) between P and Q is a and the number of such longest common subsequences between P and Q is b, then the value of a + 10b is

Select one or more:

- ☐ 20
- ☑ 34 ✔
- ☐ 42
- ☐ 28

Your answer is correct.

The correct answer is: 34

Question **8**

Correct

Mark 1.00 out of 1.00

Which of following can NOT be the Huffman encoding of three characters x,y, and z in a text file containing only those characters?

Select one or more:

- ☑ 0, 1, 00 ✔
- ☑ 10, 01, 00 ✔
- ☐ 0,10,11
- ☑ 00,01,11 ✔

Your answer is correct.

The correct answers are: 0, 1, 00, 10, 01, 00, 00,01,11

Question **9**

Correct

Mark 1.00 out of 1.00

What is longest possible length of a codeword in a Huffman encoding of n symbols? (A codeword is the encoding of a symbol)

Select one or more:

- ☐ n/2
- ☐ None of the others
- ☑ n-1 ✔
- ☐ n
- ☐ n(n-1)/2

Your answer is correct.

The correct answer is: n-1

Question **10**

Incorrect

Mark 0.00 out of 2.00

In the coin change problem, we are interested in using the fewest number of coins to make change for a given amount. Suppose a country has the following coin denominations: 1, 4, 7, 13, 28, 52, 91, 365. A greedy algorithm repeatedly picks the coin of the largest denomination that does not exceed the target money. For e.g to make change for the amount 125, we use coins, 91, then 28, then 4, then two coins of 1.

Which of the following statements are TRUE?

Select one or more:

- [ ] None of the others
- [x] This greedy algorithm always picks the optimum number of coins for this denomination of coins. ✖
- [ ] This greedy algorithm never picks the optimum number of coins for this denomination of coins.
- [ ] Only a Dynamic programming algorithm can always pick the optimum number of coins for any denomination of coins
- [x] This greedy algorithm will always pick the optimum number of coins for any denomination of coins ✖

Your answer is incorrect.

The correct answer is: Only a Dynamic programming algorithm can always pick the optimum number of coins for any denomination of coins

Question **11**

Incorrect

Mark 0.00 out of 1.00

We have seen how the Bellman-Ford algorithm can be used to solve the SSSP problem on directed graphs. We can try applying the algorithm on undirected graphs by transforming them into directed graphs as follows: every (undirected) edge (u,v) in the graph is replaced with two directed edges, one from u to v and other from v to u. The weight of these two directed edges is the same as the weight of the original undirected edge.

Using the above transformation, the Bellman-Ford algorithm is guaranteed to work correctly on:

Select one or more:

- [ ] Undirected graphs with no negative weight edges.
- [ ] No undirected graph
- [x] Undirected graphs with no negative weight cycles. ✖
- [ ] Any undirected graph.

Your answer is incorrect.

The correct answer is: Undirected graphs with no negative weight edges.

Question **12**

Incorrect

Mark 0.00 out of 1.00

Which of the following statements are TRUE?

Select one or more:

- ☐ None of the above
- ☐ The runtime of Greedy algorithms is always more than the runtime of Dynamic Programming algorithms
- ☑ A larger number of combinatorial optimisation problems can be solved by Dynamic programming than by the Greedy strategy ✔
- ☑ The runtime of Greedy algorithms is always lesser than the runtime of Dynamic Programming algorithms ✖

Your answer is incorrect.

The correct answer is: A larger number of combinatorial optimisation problems can be solved by Dynamic programming than by the Greedy strategy

Question **13**

Not answered

Marked out of 2.00

Consider an array of integers A[1..n]. We are interested in solving the following problems:

Problem 1: To find the largest sum of elements in a contiguous subarray A[i..j]

Problem 2: To find the largest product of elements in a contiguous subarray A[i..j]

For e.g if A is {-8, 10, -6, 0, 12, -7, 3}, the answer to Problem 1 is 16 (A[1..4])and Problem 2 is 480 (A[0..2]).

Which of the following statements are TRUE?

Select one or more:

- ☐ Problem 1 can be most efficiently solved using Backtracking
- ☐ Problem 1 can be most efficiently solved using Divide and Conquer
- ☐ Problem 2 can be most efficiently solved using Dynamic Programming
- ☐ Problem 2 can be most efficiently solved using Divide and Conquer

Your answer is incorrect.

The correct answers are: Problem 1 can be most efficiently solved using Divide and Conquer, Problem 2 can be most efficiently solved using Dynamic Programming

Question **14**

Not answered

Marked out of 2.00

Consider the problem of finding the longest monotonically increasing sequence of numbers in an array A[0..n-1]. One possible way to solve this problem is as follows : (Let l_i denote the length of the longest monotonically increasing sequence that starts at index i in the array).

initialize l_{n-1} to 1.

for $i = n - 2 \; to \; 0$

if $\boxed{\_\_\_\_}$ then $l_i = 1 + l_{i+1}$ else $l_i = 1$

return max$(l_0, l_1, \ldots l_{n-1})$

Which of the following statements are TRUE?

Select one or more:

- ☐ The condition in the blank space is "A[i-1] < A[i]"
- ☐ None of the others
- ☐ This algorithm uses Dynamic Programming
- ☐ The condition in the blank space is "A[i] < A[i+1]"
- ☐ This is a Backtracking algorithm

Your answer is incorrect.

The correct answers are: The condition in the blank space is "A[i] < A[i+1]", This algorithm uses Dynamic Programming

Question **15**

Not answered

Marked out of 1.00

Recall the Greedy algorithm for scheduling a set of intervals (with a given start and finish time) such that a maximum number of non-overlapping intervals are scheduled on a single resource. Which of the following greedy algorithms would also correctly solve the same problem?

Select one or more:

- ☐ If no intervals conflict, choose them all. Else, discard the interval with the longest duration and recurse.
- ☐ Choose the interval that starts first, discard all its conflicting intervals and then recurse
- ☐ Choose the interval that ends last, discard all its conflicting intervals and then recurse
- ☐ None of the others
- ☐ Choose the interval that starts last, discard all its conflicting intervals and then recurse.

Your answer is incorrect.

The correct answer is: Choose the interval that starts last, discard all its conflicting intervals and then recurse.

◄ Lab 9 Programming Exercises

Jump to...