Started on	Thursday, November 16, 2023, 7:37 PM
State	Finished
Completed on	Thursday, November 16, 2023, 7:42 PM
Time taken	5 mins 20 secs
Grade	**9.00** out of 10.00 (**90**%)

Question 1

Correct

1.00 points out of 1.00

What problem does the Floyd-Warshall algorithm solve?

a. Single source shortest paths.

b. All pairs shortest paths. ✔

c. Shortest paths in a DAG.

d. Topological Sort.

e. None of the above.

Your answer is correct.

The correct answer is:
All pairs shortest paths.

Question 2

Correct

1.00 points out of 1.00

How does the rod cutting algorithm discussed in class turn an $O(2^n)$ algorithm into an $O(n^2)$ algorithm?

a. Because of the recursive nature of the problem, use of a recursive algorithm speeds calculations.

b. The rod cutting algorithm uses a divide and conquer algorithm to recursively determine the maximum revenue from cutting each half of the rod, and then taking the maximum of the two halves, in O(n lg n) time.

c. The optimal cut for the entire rod is based on the optimal cuts for smaller portions of the rod. This means we can use a table to remember the solutions to the smaller subproblems, speeding calculations. ✔

d. All of the above.

e. None of the above.

Your answer is correct.

The correct answer is:
The optimal cut for the entire rod is based on the optimal cuts for smaller portions of the rod. This means we can use a table to remember the solutions to the smaller subproblems, speeding calculations.

Question 3

Correct

1.00 points out of 1.00

In the world of algorithms, what does the term "bottom up" mean?

a. The contents of a 2d array are added, starting at the bottom left cell and ending at the top right cell.

b. Smaller subproblems are solved first, then combined to make an overall solution. ✔

c. It is a toast made at a party to celebrate creation of a successful algorithm.

d. All of the above.

e. None of the above.

Your answer is correct.

The correct answer is:
Smaller subproblems are solved first, then combined to make an overall solution.

Question 4

Correct

1.00 points out of 1.00

If your rod-cutting results look like the table below, how many times do you cut a rod of size 6 to make the most revenue?

Length i	0	1	2	3	4	5	6	7	8
Price p_i	0	1	5	8	9	10	17	17	20
Revenue r_i	0	1	5	8	10	13	17	18	22
Cuts s_i	0	1	2	3	2	2	6	1	2

a. 0 ✔

b. 1

c. 2

d. 3

e. 4

Your answer is correct.

The correct answer is:
0

Question 5

Correct

1.00 points out of 1.00

In the subset sum problem, if you have items with weights (14, 6, 3, 22, 5) and your basket can hold 24, what is the optimal solution?

a. 22

b. 23 ✔

c. 24

d. 25

e. None of the above.

Your answer is correct.

The correct answer is:
23

Question 6
Incorrect
0.00 points out of 1.00

Assume a greedy algorithm for Subset Sum as follows: Sort the weights smallest to largest and fill the basket in that order. If the weight the basket can hold is W, in which case does the greedy algorithm fail to give the optimal results?

a. W/2, W/2, W/2+1 ✖
b. 1, W/2, W/2
c. W/4, W/4, W/2, W/2+1
d. All of the above.
e. None of the above.

Your answer is incorrect.
The correct answer is:
1, W/2, W/2

Question 7
Correct
1.00 points out of 1.00

Assume a greedy algorithm for Subset Sum as follows: Sort the weights largest to smallest and fill the basket in that order. What is true of this algorithm?

a. It will always fill the basket at least half full.
b. It will always fill the basket at least three-quarters full.
c. It will never return the optimal result.
d. All of the above.
e. None of the above. ✔

Your answer is correct.
The correct answers are:
It will always fill the basket at least half full.,
None of the above.

Question 8
Correct
1.00 points out of 1.00

What does the Subset Sum algorithm have in common with Radix Sort?

a. Both algorithms involve sorting items with different values.
b. Both algorithms use very little additional memory storage.
c. Both algorithms have a time complexity that is not completely a function of the size of the input. ✔
d. All of the above.
e. None of the above.

Your answer is correct.
The correct answer is:
Both algorithms have a time complexity that is not completely a function of the size of the input.

Question 9
Correct
1.00 points out of 1.00

How is Knapsack different from Subset Sum?

a. Subset sum can be solved by dynamic programming, whereas Knapsack requires a greedy algorithm.
b. With Knapsack the basket must always be at least half full, whereas with Subset Sum the basket will always be completely full.
c. In Knapsack, each item has a value as well as a weight. ✔
d. All of the above.
e. None of the above.

Your answer is correct.
The correct answer is:
In Knapsack, each item has a value as well as a weight.

Question 10
Correct
1.00 points out of 1.00

What is a problem with our Sequence Alignment algorithm that could make it difficult to apply to DNA sequences?

a. DNA sequences are not strings of letters.
b. Our algorithm uses an nxm matrix, which could be huge if the DNA sequences contain millions of bases. ✔
c. Our algorithm inserts gaps, which doesn't happen when DNA strands replicate.
d. All of the above are difficulties with our Sequence Alignment algorithm.
e. None of the above are difficulties.

Your answer is correct.
The correct answer is:
Our algorithm uses an nxm matrix, which could be huge if the DNA sequences contain millions of bases.