⚠ This quiz has been regraded; your score was affected.

Week 10 Quiz

Plagiarism declaration

By submitting work for this quiz I hereby declare that I understand the University's policy on **academic integrity (https://academicintegrity.unimelb.edu.au/)** and that the work submitted is original and solely my work, and that I have not been assisted by any other person (collusion) apart from where the submitted work is for a designated collaborative task, in which case the individual contributions are indicated. I also declare that I have not used any sources without proper acknowledgment (plagiarism). Where the submitted work is a computer program or code, I further declare that any copied code is declared in comments identifying the source at the start of the program or in a header file, that comments inline identify the start and end of the copied code, and that any modifications to code sources elsewhere are commented upon as to the nature of the modification.

Due May 21 at 23:59 **Points** 10 **Questions** 7
Available May 12 at 10:00 - May 21 at 23:59 10 days **Time Limit** None
Allowed Attempts Unlimited

Instructions

You should attempt the quiz after the lecture and your tutorial.

- The quiz is available for a period of 10 days.
- You may attempt the quiz multiple times (if you happen to get a question wrong, you can do it again)
- Your score on the quiz will be recorded in the grade book.
- The quiz might not display equations correctly in some browsers. If you experience problems, we recommend that you use Firefox.

Note: you must complete at least eight of the weekly quizzes to meet one of the hurdle requirements in this subject.

This quiz was locked May 21 at 23:59.

Attempt History

	Attempt	Time	Score	Regraded
LATEST	Attempt 1	13 minutes	4 out of 10	5 out of 10

Score for this attempt: **5** out of 10
Submitted May 21 at 17:58
This attempt took 13 minutes.

Question 1

0 / 1 pts

Run the dynamic-programming algorithm for the coin-row problem on this instance: 100 5 20 50 100 100 10 5 20 20. Which amount (in cents) does it produce?

ou Answered

225

orrect Answers

275 (with margin: 0)

Nope, have another go. Try to just follow the algorithm mechanically (then think later about why it works).

Question 2

1 / 1 pts

Consider this instance of the knapsack problem. We have a total capacity W = 12 and six items, with weights and values as follows:

item	weight	value
1	3	20
2	2	15
3	3	25
4	4	30
5	5	30
6	6	50

The dynamic programming algorithm will establish that the optimal value that can be achieved for this instance is:

Correct!

95

orrect Answers

95 (with margin: 0)

Yes, that's right. Items 2, 4 and 6 will be selected.

Question 3

Original Score: 0 / 1 pts Regraded Score: 1 / 1 pts

This question has been regraded.

If a dynamic programming problem satisfies the optimal-substructure property, then a locally optimal solution is globally optimal.

True

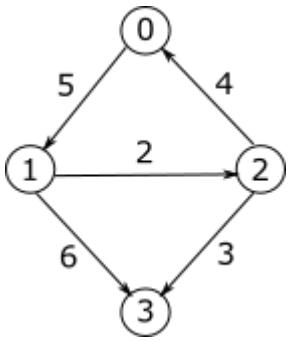
Correct!

False

Question 4

1 / 1 pts

Consider the following directed weighted graph:



Which of the following represents the initial state of the |V|x|V| shortest distance matrix constructed by the Floyd's algorithm for the above graph?

Correct!

	0	1	2	3
0	0	5	∞	∞
1	∞	0	2	6
2	4	∞	0	3
3	∞	∞	∞	0

	0	1	2	3
0	0	5	4	∞
1	5	0	2	6
2	4	2	0	3
3	∞	6	3	0

	0	1	2	3
0	0	5	0	0
1	0	0	2	6
2	4	0	0	3
3	0	0	0	0

	0	1	2	3
0	∞	∞	∞	∞
1	5	∞	2	6
2	4	∞	∞	3
3	∞	∞	∞	∞

For each vertex V, the shortest distance between it and itself (V, V) is marked as 0. For all edges (U, V) in the graph, we initialise the distance at row U and column V to the weight of the edge. All other slots in the matrix are initialised to infinity.

Question 5

0 / 1 pts

Consider a graph with vertices V and edges E. What is the worst case big-O complexity of the Floyd algorithm when applied to this graph? Select the tightest big-O bound of those listed below.

ou Answered

- (●) $O(|E| + |V| \log |V|)$

orrect Answer

- ( ) $O(|V|^3)$
- ( ) $O(|E||V| + |V|^2 \log |V|)$
- ( ) $O(|V|^2)$

If you study the pseudocode of the Floyd-Warshall algorithm, you will notice that there are is a nested 'for' loop of three levels. Each for loop iterates over the each vertex in the graph.

Question 6

1 / 1 pts

Which one of the following statements about Floyd's algorithm running on a graph with V nodes and E edges is correct?

Correct!

- (selected) The iterative (dynamic programming) version finds the shortest path between all pairs of nodes in time $O(V^3)$
- The iterative (dynamic programming) version finds the shortest path between all pairs of nodes in $O(3^E)$ time
- The iterative (dynamic programming) version always finds a minimal spanning tree rooted at every node in $O(V^3)$ time.
- The recursive version finds the transitive closure of a graph in $O(3^V)$ time.

Question 7

1 / 4 pts

Use Warshall's algorithm to compute the transitive closure of the graph with the following adjacency matrix:

0	**0**	**1**	**1**
1	**0**	**0**	**1**
0	**0**	**0**	**0**
0	**1**	**1**	**0**

Choose the correct values for the unknown variables after each of the four steps for the algorithm.

After the first step:

0	**0**	**1**	**1**
1	$\mathbf{a_1}$	$\mathbf{b_1}$	**1**
0	**0**	**0**	**0**
$\mathbf{c_1}$	**1**	**1**	**0**

[Select]

After the second step:

0	**0**	**1**	**1**
1	**a_2**	**b_2**	**1**
0	**0**	**0**	**0**
c_2	**1**	**1**	**1**

[Select]

After the third step:

0	**0**	**1**	**1**
1	**a_3**	**b_3**	**1**
0	**0**	**0**	**0**
c_3	**1**	**1**	**1**

[Select]

After the fourth and final step:

1	**1**	**1**	**1**
1	**a_4**	**b_4**	**1**
0	**0**	**0**	**0**
c_4	**1**	**1**	**1**

[Select]

Answer 1:

Correct!

a1=0, b1=1, c1=0

Answer 2:

ou Answered

a2=1, b2=1, c2=0

orrect Answer

a2=0, b2=1, c2=1

Answer 3:

ou Answered

a3=1, b3=1, c3=0

orrect Answer

a3=0, b3=1, c3=1

Answer 4:

ou Answered

a4=1, b4=1, c4=0

orrect Answer

a4=1, b4=1, c4=1

Quiz Score: **5** out of 10