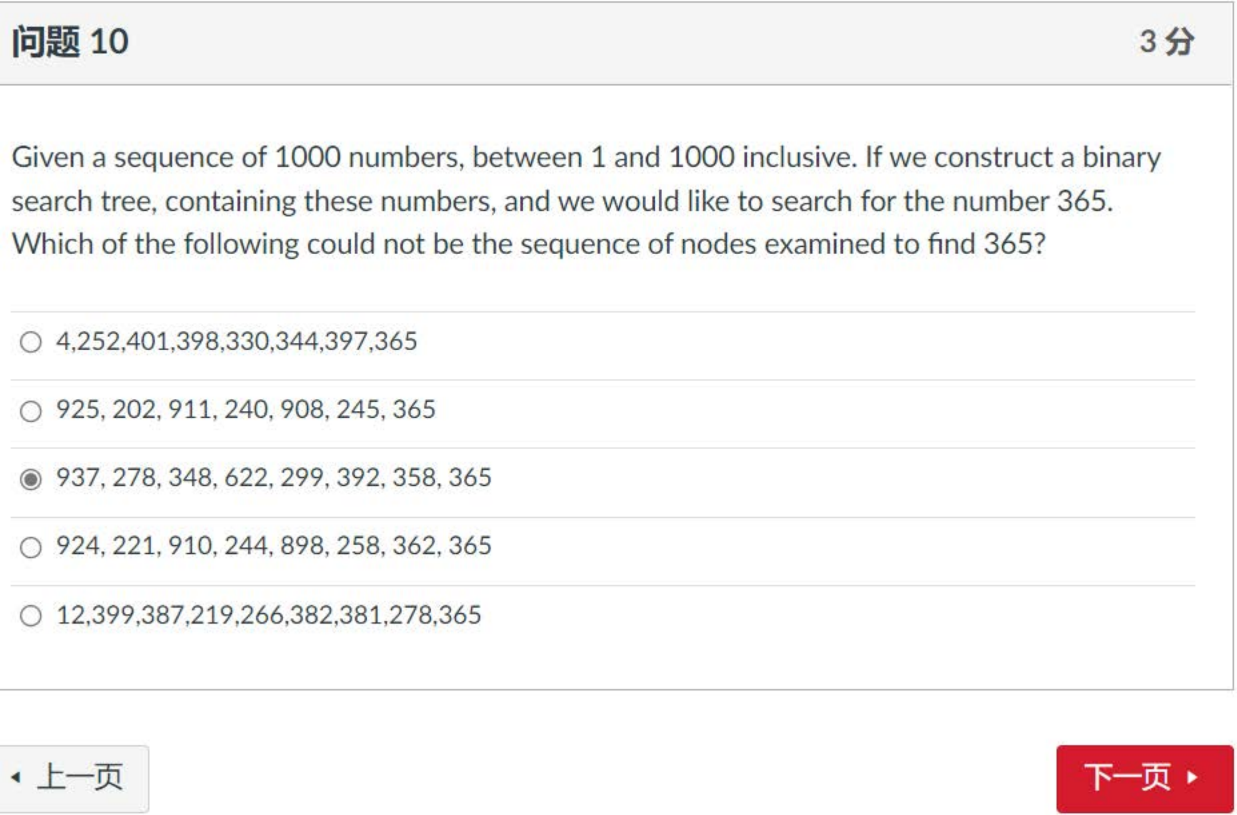


## 问题 10

3 分

Given a sequence of 1000 numbers, between 1 and 1000 inclusive. If we construct a binary search tree, containing these numbers, and we would like to search for the number 365. Which of the following could not be the sequence of nodes examined to find 365?

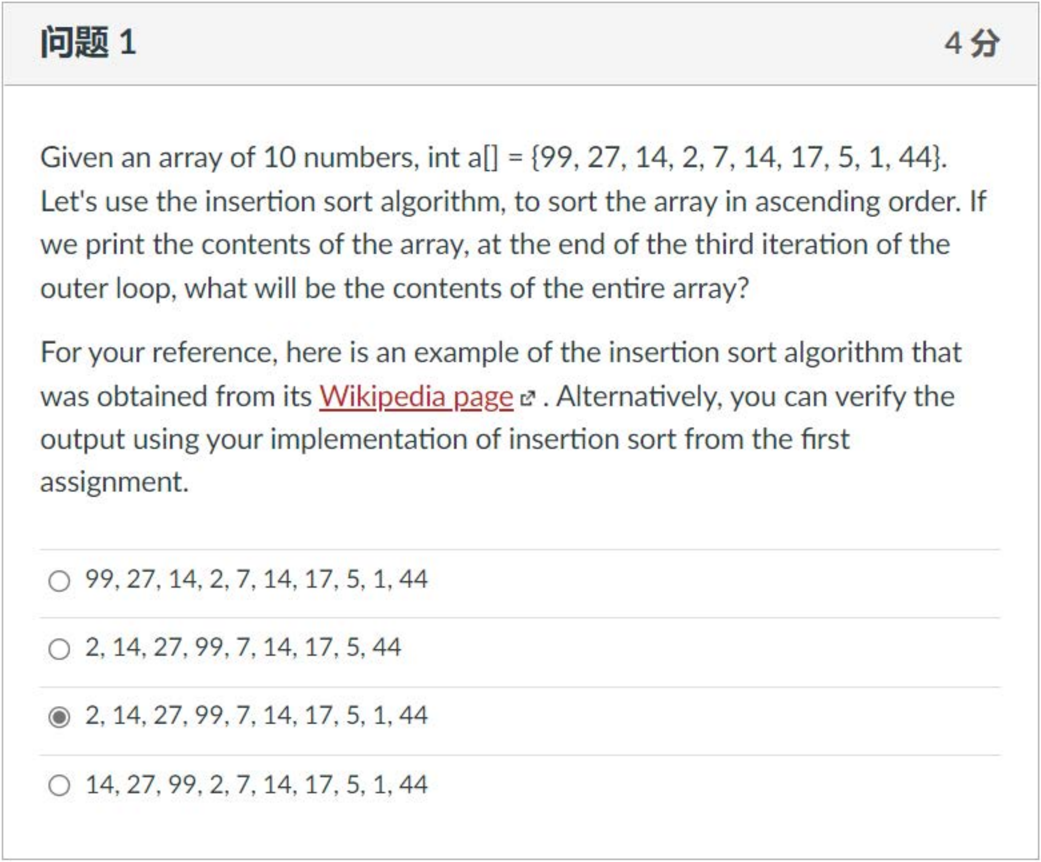
○ 4,252,401,398,330,344,397,365

○ 925, 202, 911, 240, 908, 245, 365

● 937, 278, 348, 622, 299, 392, 358, 365

○ 924, 221, 910, 244, 898, 258, 362, 365

○ 12,399,387,219,266,382,381,278,365



## 问题 1

4 分

Given an array of 10 numbers, int a[] = {99, 27, 14, 2, 7, 14, 17, 5, 1, 44}. Let's use the insertion sort algorithm, to sort the array in ascending order. If we print the contents of the array, at the end of the third iteration of the outer loop, what will be the contents of the entire array?

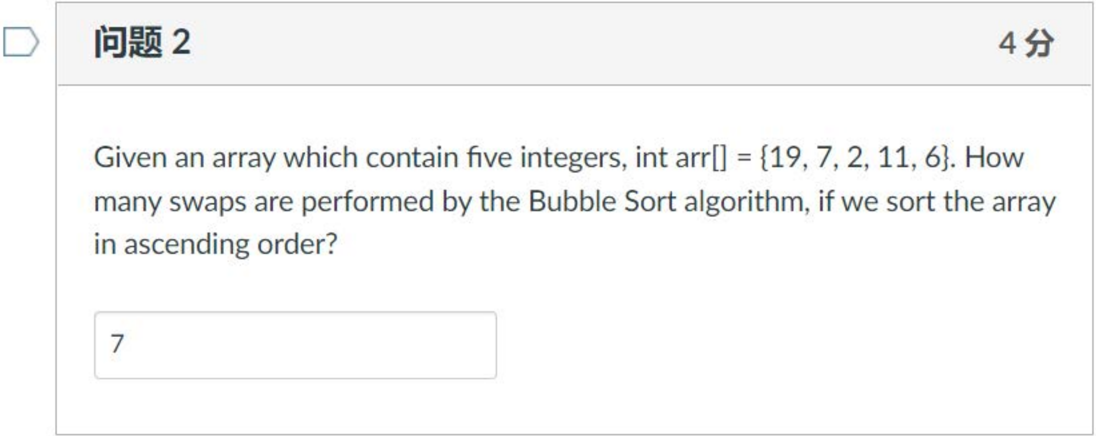
For your reference, here is an example of the insertion sort algorithm that was obtained from its Wikipedia page . Alternatively, you can verify the output using your implementation of insertion sort from the first assignment.

○ 99, 27, 14, 2, 7, 14, 17, 5, 1, 44

○ 2, 14, 27, 99, 7, 14, 17, 5, 44

● 2, 14, 27, 99, 7, 14, 17, 5, 1, 44

○ 14, 27, 99, 2, 7, 14, 17, 5, 1, 44

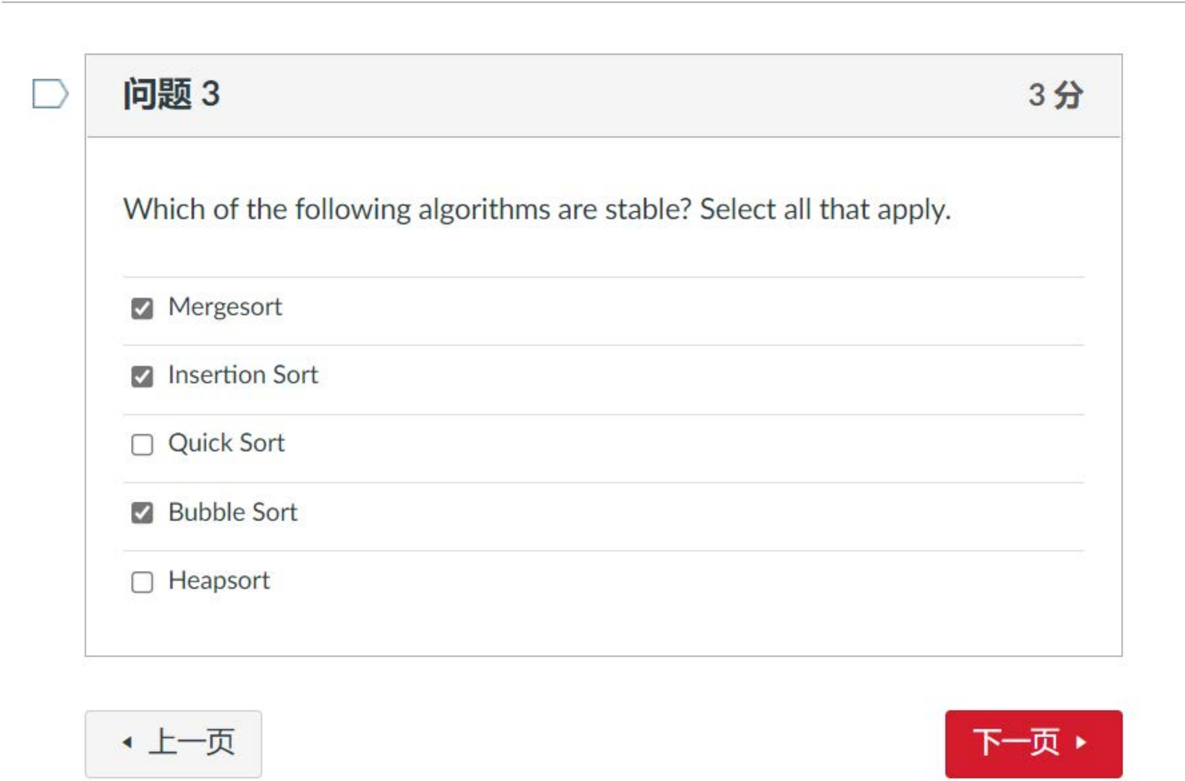


问题 2

4 分

Given an array which contain five integers, int arr[] = {19, 7, 2, 11, 6}. How many swaps are performed by the Bubble Sort algorithm, if we sort the array in ascending order?

7



问题 3 3 分

Which of the following algorithms are stable? Select all that apply.

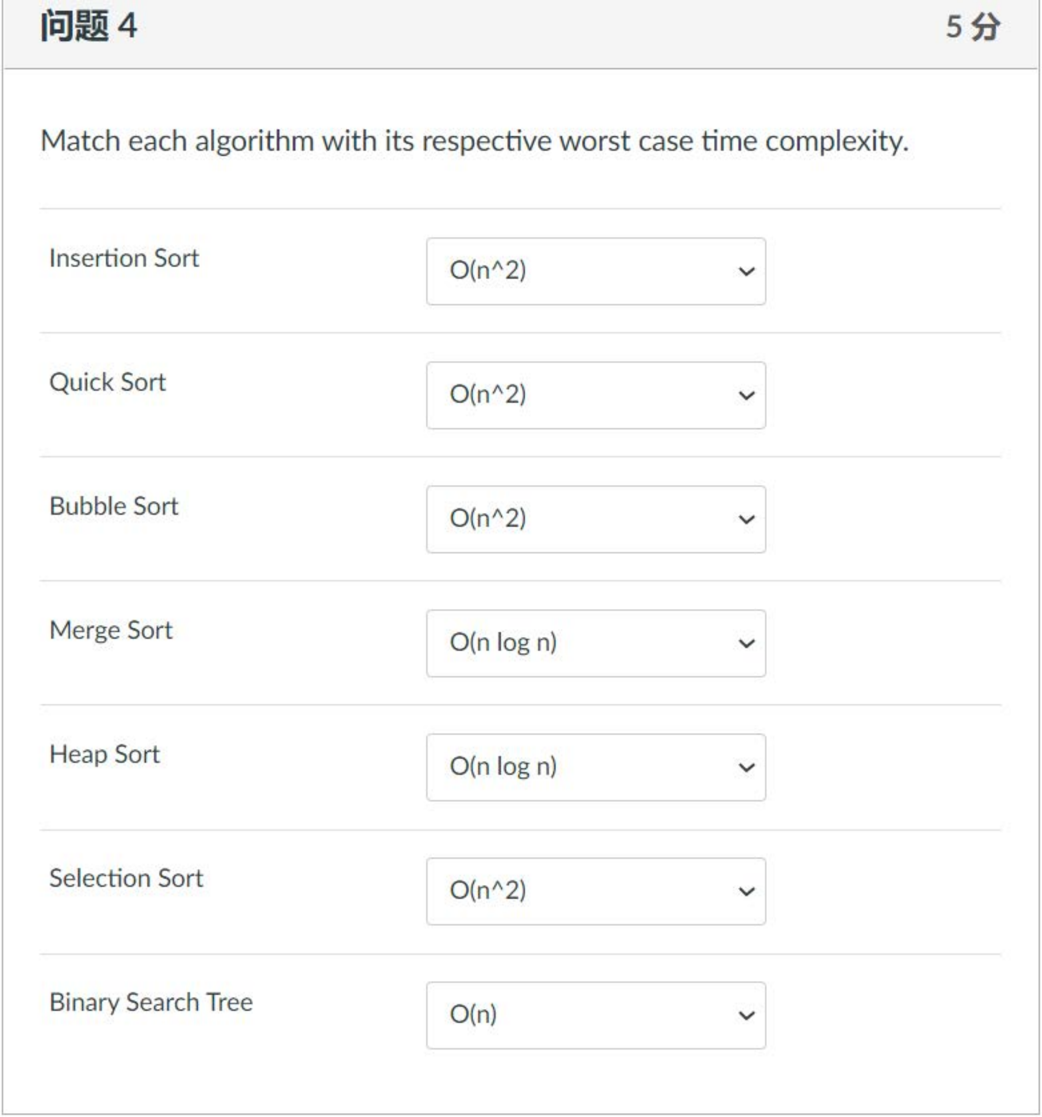
☑ Mergesort

☑ Insertion Sort

□ Quick Sort

☑ Bubble Sort

□ Heapsort



## 问题 4

5 分

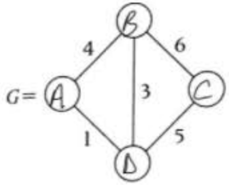
Match each algorithm with its respective worst case time complexity.

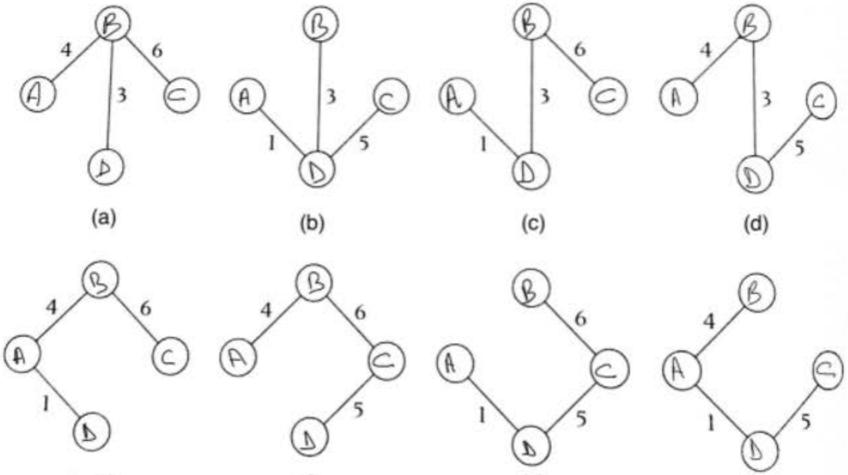
| | |
|---|---|
| Insertion Sort | O(n^2) |
| Quick Sort | O(n^2) |
| Bubble Sort | O(n^2) |
| Merge Sort | O(n log n) |
| Heap Sort | O(n log n) |
| Selection Sort | O(n^2) |
| Binary Search Tree | O(n) |

## 问题 5

5 分

For the following graph, G, and its possible spanning trees labeled (a) to (h). What is the cost of the minimum spanning tree?





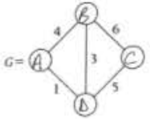
(a) (b) (c) (d)

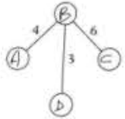
(e) (f) (g) (h)

9

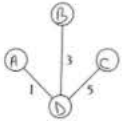
**问题 6** 5 分

For the given graph, G, which of the following trees (labeled from a - h) are possible spanning trees. Select all that apply.

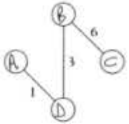




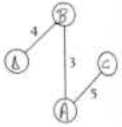
(a)



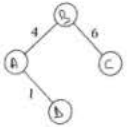
(b)



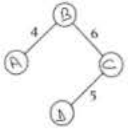
(c)



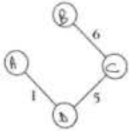
(d)



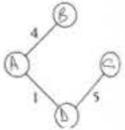
(e)



(f)



(g)

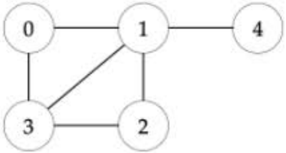


(h)

- □ d
- ☑ e
- □ None of the above
- ☑ c
- ☑ b
- ☑ a
- □ All of the above
- ☑ h
- ☑ g
- ☑ f

## 问题 7

Given the graph below, which of the following is its correct adjacency matrix:



○

| | 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| 0 | 0 | 1 | 0 | 1 | 0 |
| 1 | 1 | 0 | 1 | 0 | 1 |
| 2 | 0 | 0 | 0 | 1 | 0 |
| 3 | 1 | 0 | 1 | 0 | 0 |
| 4 | 0 | 1 | 0 | 0 | 1 |

●

| | 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| 0 | 0 | 1 | 0 | 1 | 0 |
| 1 | 1 | 0 | 1 | 1 | 1 |
| 2 | 0 | 1 | 0 | 1 | 0 |
| 3 | 1 | 1 | 1 | 0 | 0 |
| 4 | 0 | 1 | 0 | 0 | 0 |

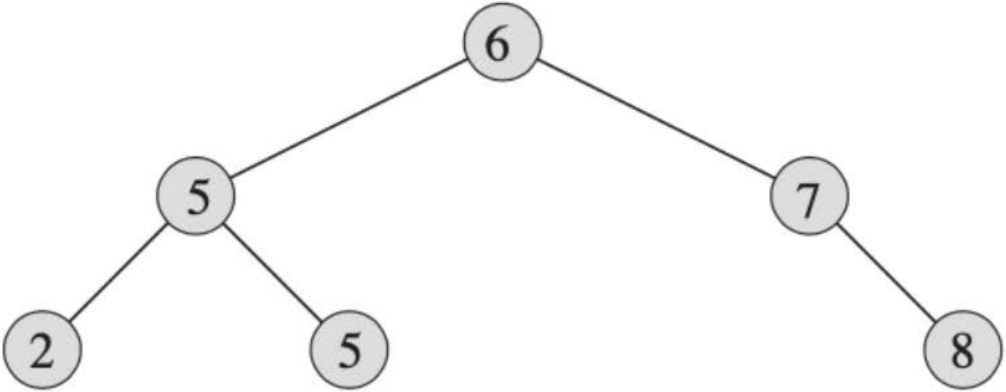
○

| | 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| 0 | 1 | 1 | 0 | 1 | 0 |
| 1 | 1 | 0 | 1 | 1 | 1 |
| 2 | 0 | 1 | 0 | 1 | 0 |
| 3 | 1 | 1 | 1 | 0 | 0 |
| 4 | 0 | 1 | 0 | 0 | 1 |

## 问题 8

3 分

Given the following binary search tree, what is the resulting sequence if a *post-order traversal* is performed? Ensure that your response is comma separated, e.g. 1,2,3,4

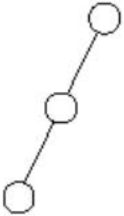


2,5,5,8,7,6

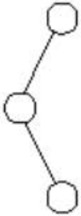
## 问题 9

3 分

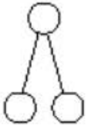
Given the diagram below, indicate which of the following is a Binary Tree? Select all that apply.



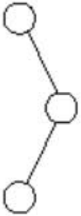
(a)



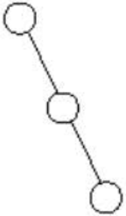
(b)



(c)



(d)



(e)

☑ a

☑ d

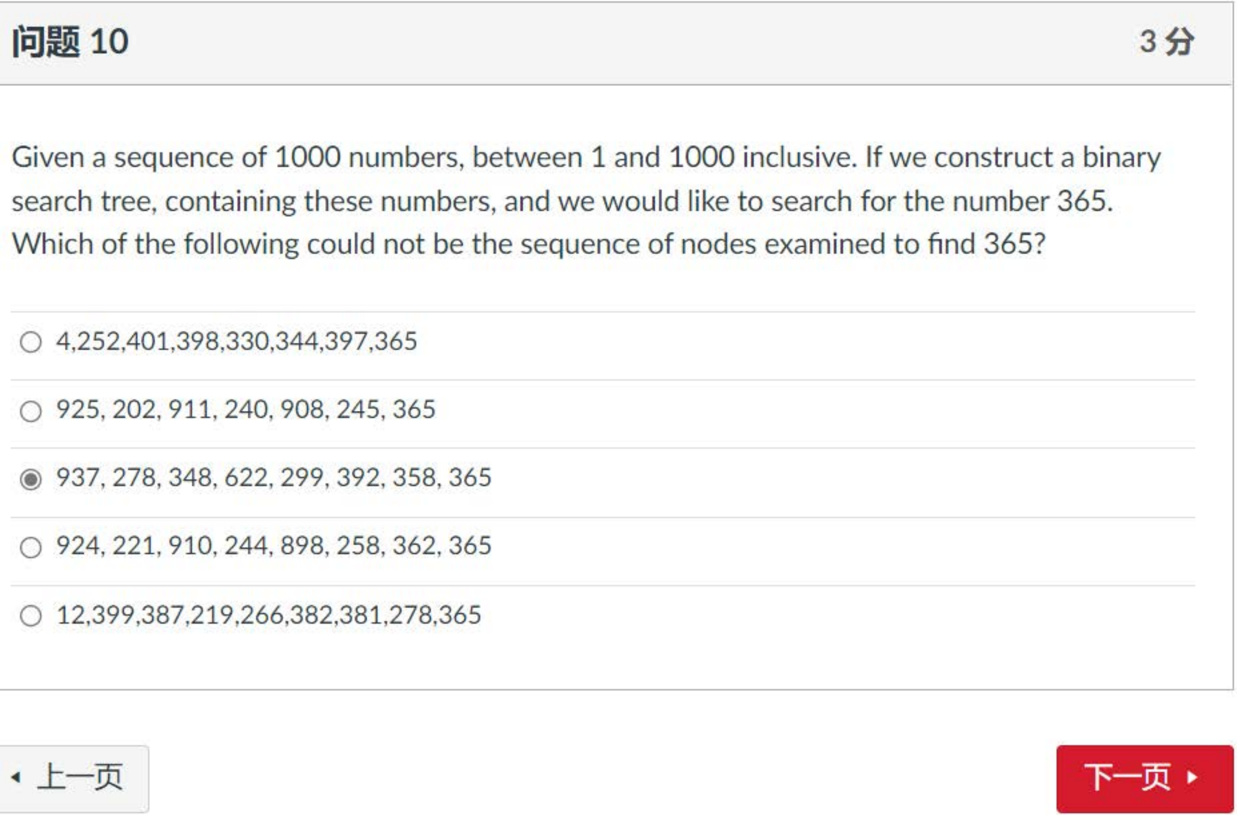
☑ e

☑ c

☑ b

◂ 上一页

下一页 ▸



问题 10 3 分

Given a sequence of 1000 numbers, between 1 and 1000 inclusive. If we construct a binary search tree, containing these numbers, and we would like to search for the number 365. Which of the following could not be the sequence of nodes examined to find 365?

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○ 925, 202, 911, 240, 908, 245, 365

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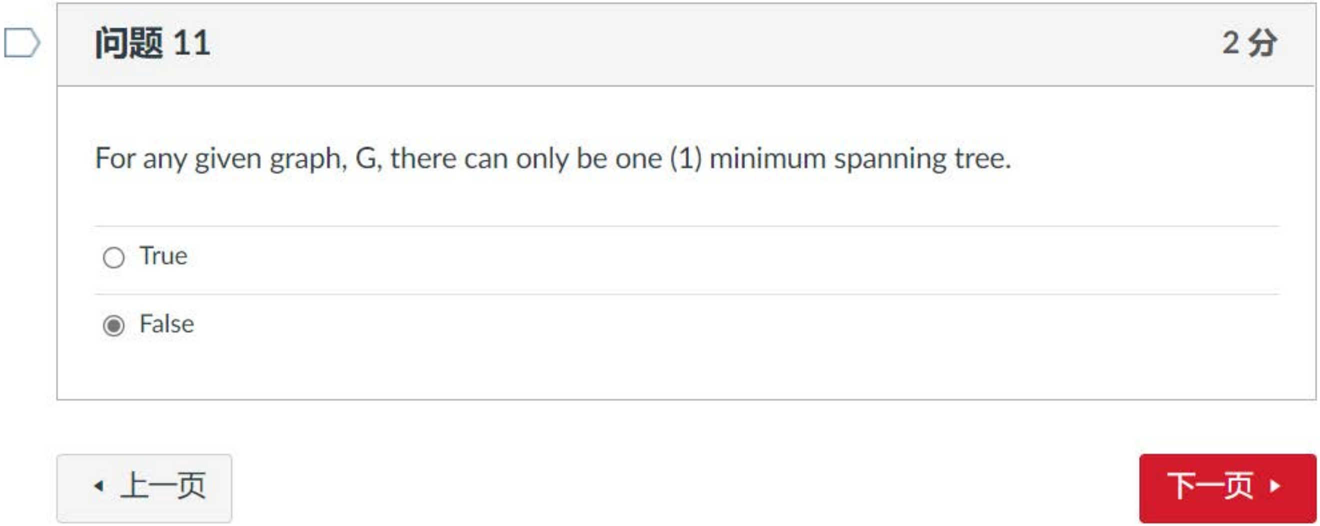


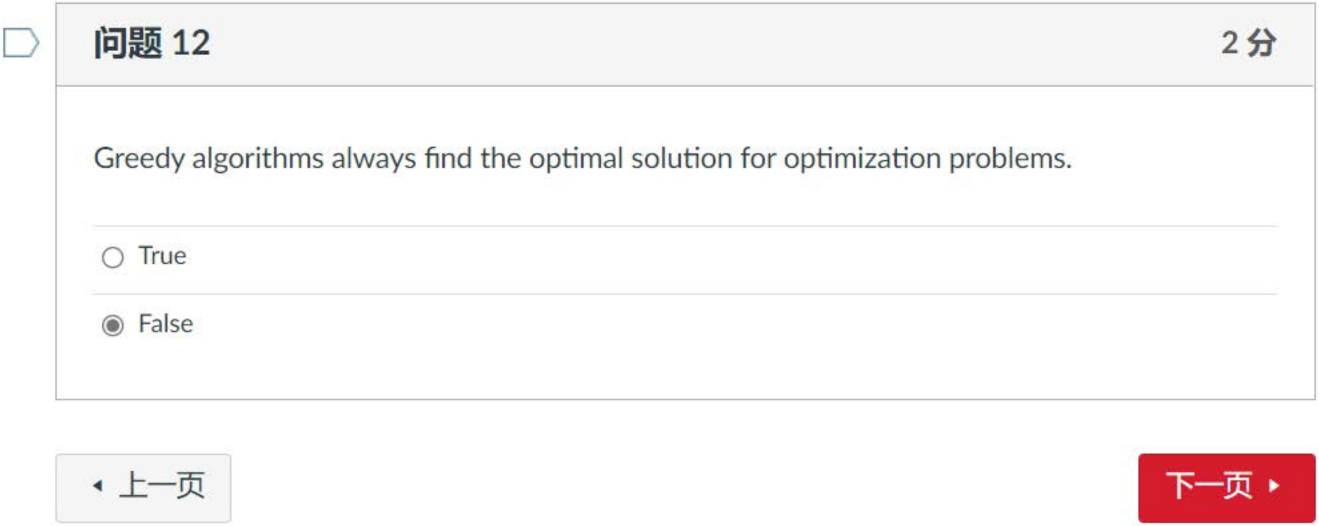
## 问题 11

2 分

For any given graph, G, there can only be one (1) minimum spanning tree.

○ True

● False



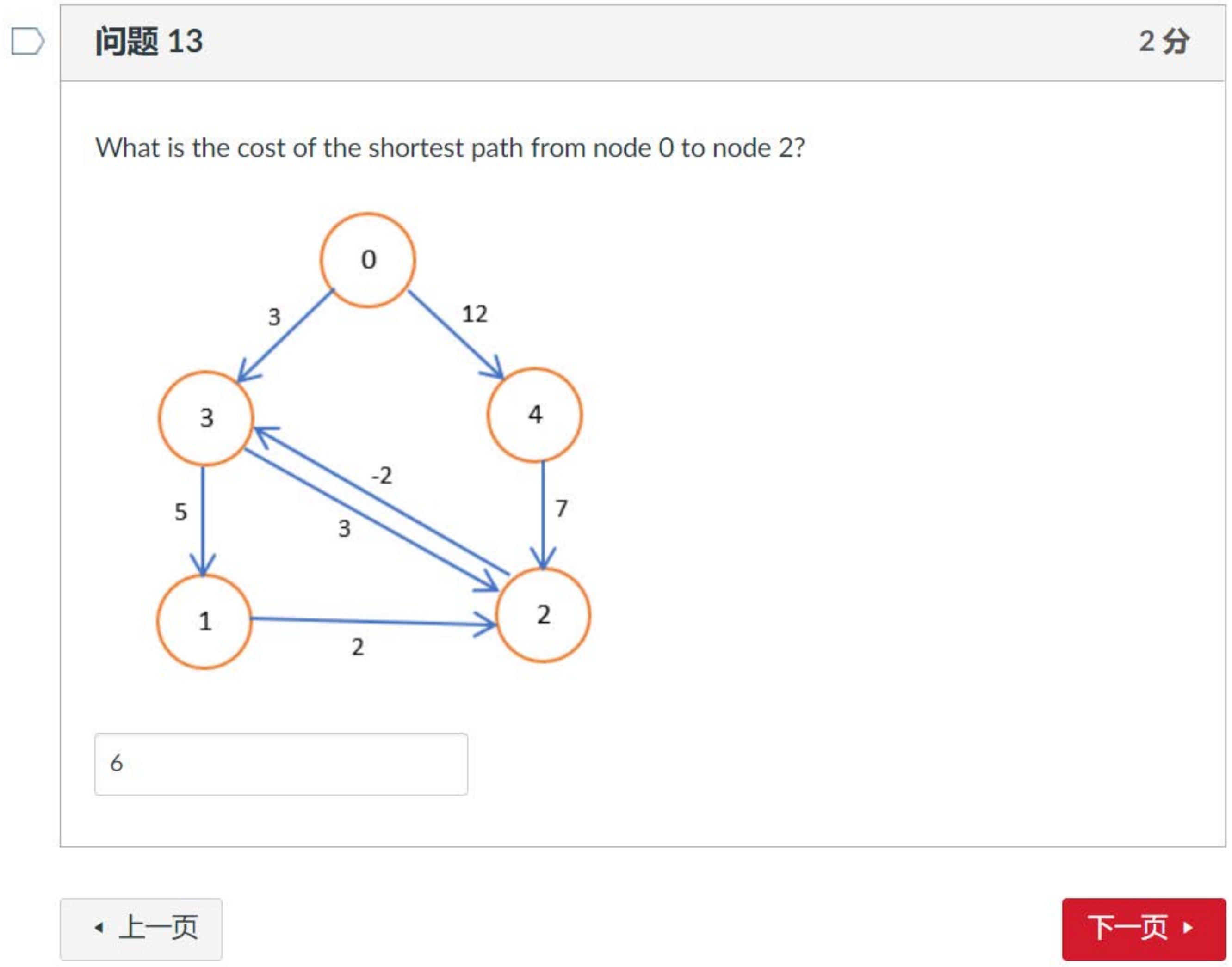
问题 12

2 分

Greedy algorithms always find the optimal solution for optimization problems.

○ True

● False

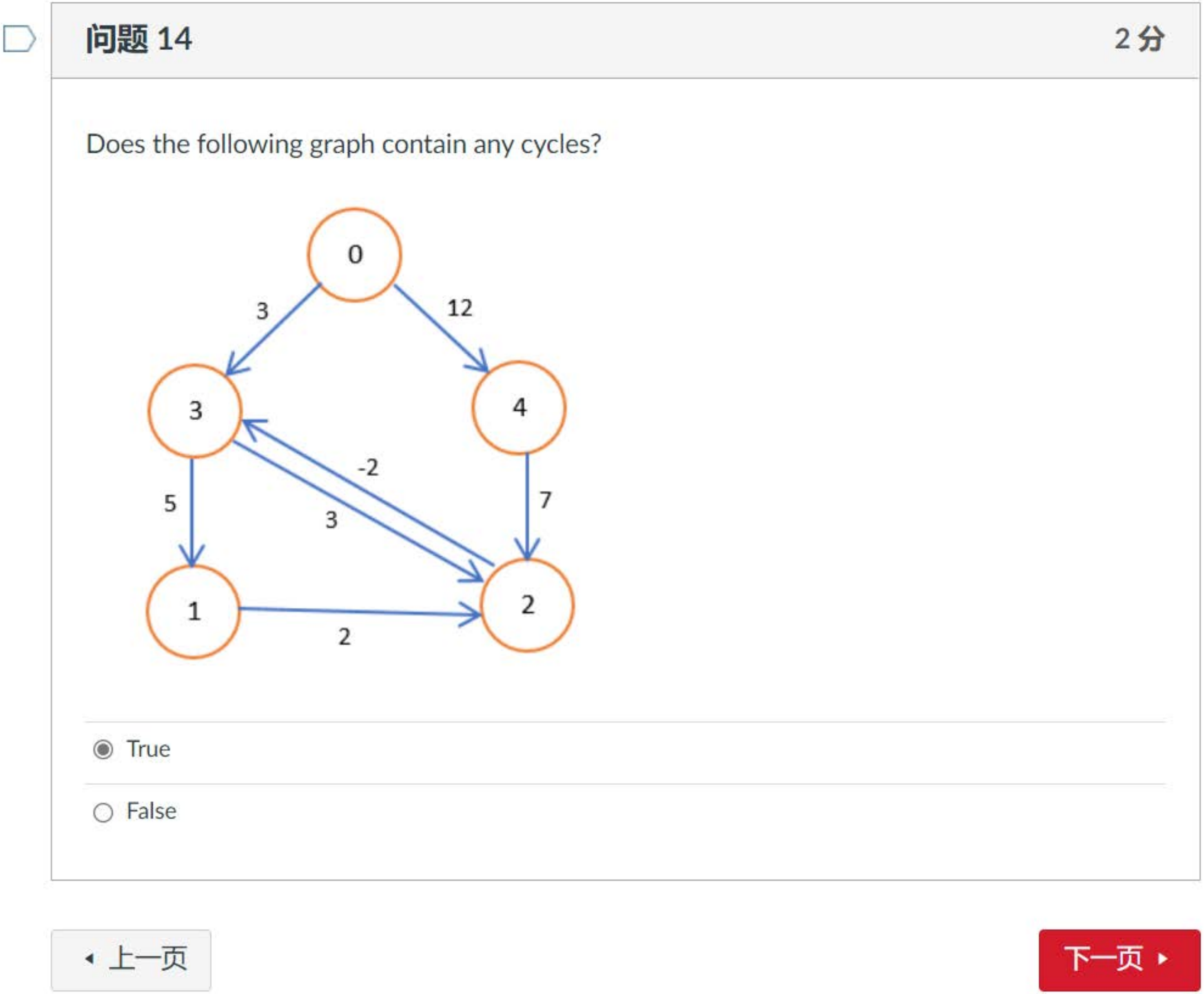


## 问题 13

2 分

What is the cost of the shortest path from node 0 to node 2?

6



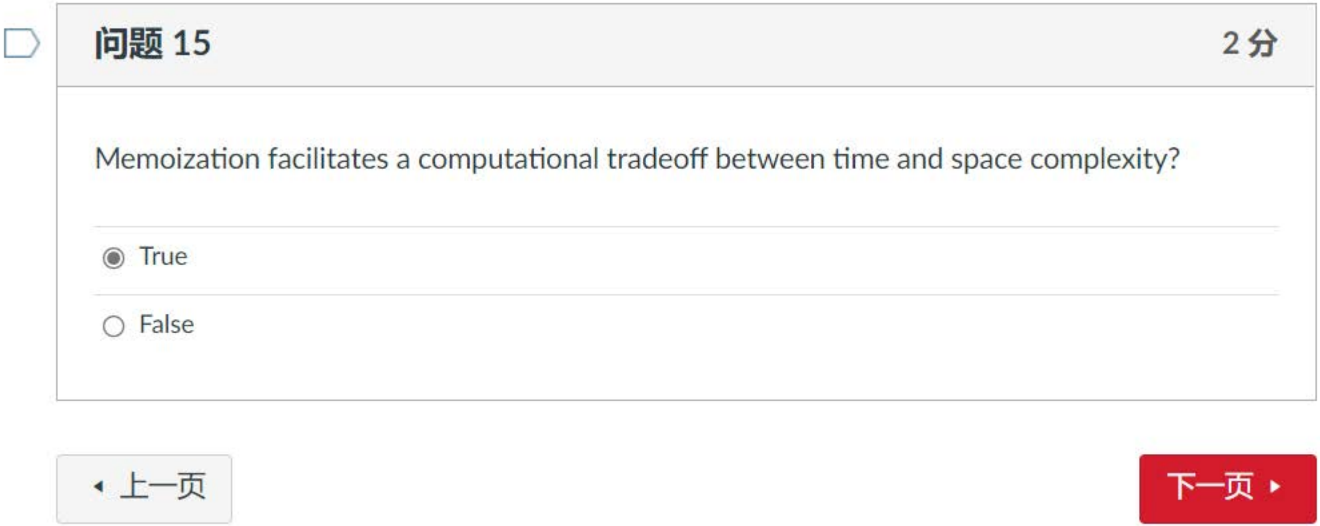
## 问题 14

2 分

Does the following graph contain any cycles?

● True

○ False



问题 15

2 分

Memoization facilitates a computational tradeoff between time and space complexity?

● True

○ False