

QuizW12

2016年6月3日 15:23

2016/6/3

Review Test Submission: Revision (fun) – COMP90038_2016_SM1



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Haoyu Lin 68 ▾



Weekly Quizzes Review Test Submission: Revision (fun)

Review Test Submission: Revision (fun)

User	Haoyu Lin
Subject	Algorithms and Complexity
Test	Revision (fun)
Started	3/06/16 3:16 PM
Submitted	3/06/16 3:23 PM
Status	Completed
Attempt Score	19 out of 20 points
Time Elapsed	6 minutes

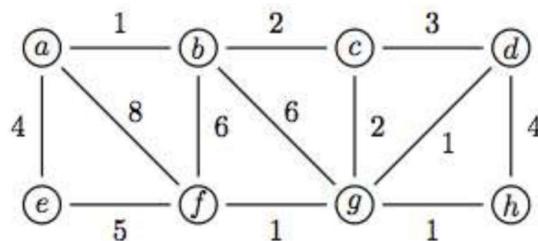
Results Displayed All Answers, Submitted Answers, Feedback, Incorrectly Answered Questions

Question 1

1 out of 1 points



Consider the graph below. What is the cost of its minimum spanning tree, that is, the sum of its edges' weights?



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Review Test Submission: Revision (fun) – COMP90038_2016_SM1

Selected Answer: 12

Response Feedback: You got that right!

Question 2

1 out of 1 points



Assume we want to sort integers into ascending order. To sort a small array that contains 42, 17, insertion sort will perform three assignments. How many assignments will insertion sort perform to sort an array that contains these 10 elements: 9, 8, 7, 6, 5, 4, 3, 2, 1, 0 ?

- Selected Answer: e. 63
Answers:
a. 15
b. 18
c. 24
d. 55
e. 63

W5Q2

Response Feedback: Yes, that's right. The number of assignments is $3 + 4 + \dots + 11 = 63$.

Question 3

1 out of 1 points



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?

Selected Answer: 275

Response Feedback: Yes, that's right. Nifty linear-time algorithm, isn't it?

W10Q4

Question 4

1 out of 1 points

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A complete binary tree has this inorder traversal sequence: 7, 4, 1, 0, 8, 5, 6, 3, 9, 2. What is the key at its root?

Selected Answer: 6

Response Feedback: Yes, that's right.

W6Q2

Question 5

1 out of 1 points



Find the time complexity for the following function (the basic operation is the innermost loop body's assignment).

```
function f(n)
    r ← 0
    m ← 1
    for i ← 1 to n do
        m ← 3 × m
        for j ← 1 to m do
            r ← r + j
    return r
```

W4Q4

Selected Answer: $\Theta(3^n)$

b.

Answers: $\Theta(n^3)$

a.

$\Theta(3^n)$

b.

$\Theta(n \log n)$

c.

$\Theta(n^2)$

d.

$\Theta(n)$

e.

Response: Yes, this requires a formula for the geometric series $3 + 3^2 + 3^3 + \dots + 3^n$. (Actually it is easy enough to find $x = 3 + 3^2 + 3^3 + \dots + 3^n$, by observing that we get back to x if we multiply the sum by 3, then add 3, and subtract 3^{n+1} . So just solve the equation $x = 3 + 3x - 3^{n+1}$.)

Question 6

1 out of 1 points



An AVL tree is constructed by inserting the following numbers in this order: 1, 7, 2, 6, 3, 5, 4. The in-, pre- and post-order traversals of the resulting tree are:

Selected Answer: In-order: 1, 2, 3, 4, 5, 6, 7
Pre-order: 3, 2, 1, 6, 5, 4, 7
c. Post-order: 1, 2, 4, 5, 7, 6, 3

Answers: In-order: 1, 2, 3, 4, 5, 6, 7
Pre-order: 4, 2, 1, 3, 6, 5, 7
a. Post-order: 1, 3, 2, 5, 7, 6, 4

W8Q4

In-order: 5, 1, 3, 4, 6, 7, 2
Pre-order: 6, 1, 5, 3, 4, 7, 2
b. Post-order: 5, 4, 3, 1, 2, 7, 6

In-order: 1, 2, 3, 4, 5, 6, 7
Pre-order: 3, 2, 1, 6, 5, 4, 7
c. Post-order: 1, 2, 4, 5, 7, 6, 3

In-order: 1, 2, 3, 4, 5, 6, 7
Pre-order: 2, 1, 6, 3, 4, 5, 7
d. Post-order: 1, 4, 5, 3, 7, 6, 2

e. None of the above

Response Feedback: Yes, well done.

Question 7

1 out of 1 points



Given the string 001001001001 we wish to use some string search algorithm to see if the string contains the substring 111. The candidates are the brute-force method and Horspool's. The number of character comparisons the two will make are, respectively:

Selected Answer: b. 13 and 5

Answers: a. 13 and 4

- b. 13 and 5
- c. 12 and 5
- d. 12 and 6
- e. 13 and 6
- f. 13 and 8

Response Feedback: Yes, that's good.

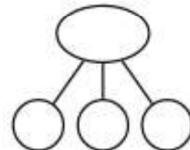
W10Q1

Question 8

1 out of 1 points



A 2-3 tree has the shape shown here, and it contains the keys 1-5. Which of the following sequences (giving the order in which the keys are inserted) could have generated that shape? (There could be more than one.)



W9Q3

Selected Answers: a. 1, 2, 3, 4, 5

- c. 1, 4, 2, 3, 5
- d. 4, 3, 5, 2, 1

Answers:

- a. 1, 2, 3, 4, 5
- b. 1, 3, 5, 2, 4
- c. 1, 4, 2, 3, 5
- d. 4, 3, 5, 2, 1
- e. 5, 2, 3, 1, 4

Response Feedback: Yes, well done.

Question 9

1 out of 1 points



We wish to turn an array into a max-heap, using the bottom-up heap construction algorithm. From the outset, the array contains 0 1 2 3 4 5 6 7 8 9. When the algorithm terminates, the array contains

Selected Answer: c. 9 8 6 7 4 5 2 0 3 1

- Answers:
- a. 9 8 5 6 7 1 4 0 3 2
 - b. 9 8 5 6 7 2 4 0 3 1
 - c. 9 8 6 7 4 5 2 0 3 1
 - d. 9 8 6 4 7 5 2 0 3 1
 - e. 9 8 6 7 5 4 2 0 3 1

W7Q3

Response Feedback: Yes, well done.

Question 10

1 out of 1 points



Suppose we have an array A with 33,554,431 elements. We want to apply binary search to look for some element k. A test of the form "is $k = A[i]$?" is a probe. How many probes will be performed in the worst case?

Selected Answer: 25

Response Feedback: Yes, the number of elements is $2^{25} - 1$. We have a worst-case instance if k is not in the array.

W5Q4

Question 11

1 out of 1 points



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

W11Q1

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

Selected Answer: 95

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

Question 12

1 out of 1 points



A hash table with 5003 entries is used with linear probing (that is, in an open-addressing manner). It currently holds 4000 keys/records. How many probes should we expect during a lookup for some key that is in fact present (that is, in a successful search)?

Selected Answer: b. 3

Answers: a. 2

b. 3

c. 4

d. 5

e. 6

f. At least 7

W10Q3

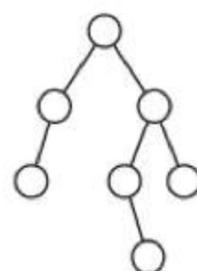
Response Feedback: Yes, you have earned another badge.

Question 13

1 out of 1 points



The AVL tree shown below was constructed by inserting the seven keys in a particular order. Identify which of the four insertion sequences below would generate an AVL tree of this shape.



W9Q4

Selected Answer: d. F, B, C, D, A, G, E

Answers: a. A, B, C, D, E, F, G

b. B, C, D, E, F, G, A

c. C, E, G, B, D, F, A

d. F, B, C, D, A, G, E

Response Feedback: Yes, that's right.

Question 14

1 out of 1 points



Each line below gives the contents of an array that represents a complete binary tree. Identify all the cases in which that binary tree is a max-heap.

Selected Answers: a. 9 8 2 5 7 1 0 4 3 6

c. 9 8 6 5 7 1 4 3 2 0

d. 9 8 6 4 7 1 0 3 2 5

e. 9 8 7 6 5 4 3 2 1 0

Answers:

- a. 9 8 2 5 7 1 0 4 3 6
- b. 9 8 6 5 4 7 3 2 1 0
- c. 9 8 6 5 7 1 4 3 2 0
- d. 9 8 6 4 7 1 0 3 2 5
- e. 9 8 7 6 5 4 3 2 1 0

Response Feedback: Yes, indeed. All but one.

W7Q4

Question 15

1 out of 1 points



Assume we want to sort integers into ascending order. To sort a small array that contains 42, 17, selection sort will perform one swap, or three assignments. How many assignments will it perform to sort an array that contains these 10 elements: 9, 8, 7, 6, 5, 4, 3, 2, 1, 0 ?

- Selected Answer: a. 15
- Answers:
- a. 15
 - b. 18
 - c. 24
 - d. 55
 - e. 63

W5Q1

Response Feedback: Yes, that's right. Just five swaps altogether. Selection sort does very little data movement.

Question 16

0 out of 1 points



Suppose we run Dijkstra's single-source shortest-path algorithm on the weighted directed graph below, starting from node a. When the algorithm terminates, the seven edges ($\text{prev}[u], u$), with u in the set {b,c,d,e,f,g,h}, make up the shortest-path tree. What is the tree's weight, that is, what is the sum of its edges' weights?



can't see

Selected Answer: [None Given]

Response Feedback: No, have another go at it. You may want to try to actually run Dijkstra's algorithm and become more familiar with it.

Question 17

1 out of 1 points



In Lecture 5 we discussed the brute-force approach to string search. How many character comparisons will the algorithm make when searching for 'lido' in the string

'supercalifragilisticexpialidocious' ?

Selected Answer: 33

Response Feedback: That's right - well done.

W3Q3

Question 18

1 out of 1 points

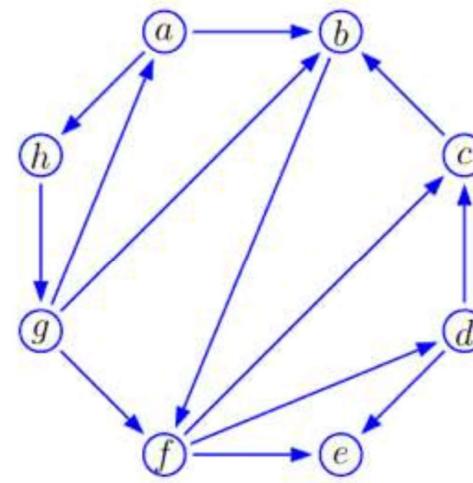
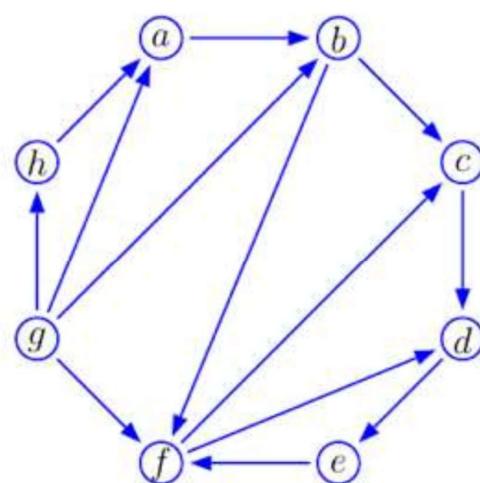


For one of these four directed graphs, the 8 nodes will be visited in the same order by BFS and DFS (given the usual assumption that ties are resolved by using alphabetical order). Click on that graph.

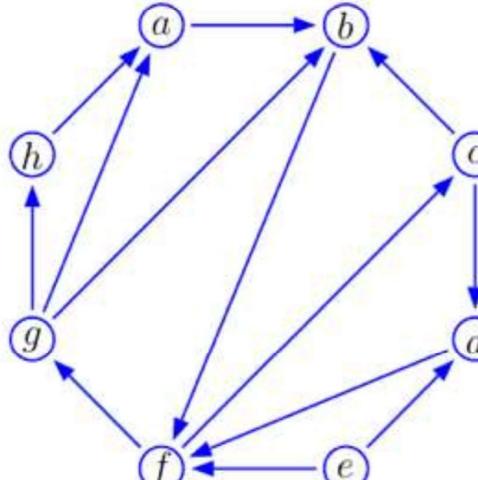
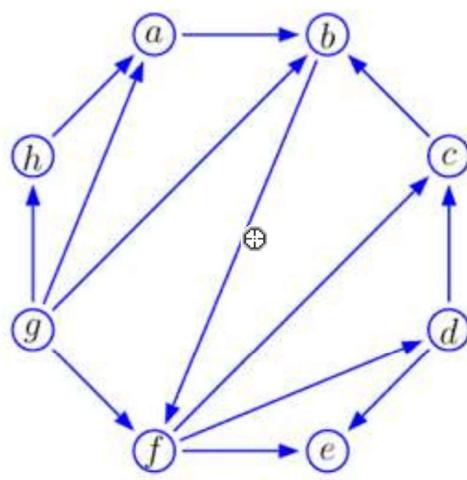
Selected Answer: 177, 460

Answers:

Student Response



W4Q1



Response Feedback: Yes, well done. Whether we use DFS or BFS the sequence will be a b f c d e g h.

1 out of 1 points

Question 19

Consider this recurrence relation:

$$\begin{aligned} T(1) &= 1 \\ T(n) &= 2 T(n/3) + 2n + 1 \quad \text{for } n > 1 \end{aligned}$$

The Master Theorem says that

- Selected Answer: $T(n) \in \Theta(n)$
e.
- Answers:
 a. $T(n) \in \Theta(n^3)$
 b. $T(n) \in \Theta(n^2)$
 c. $T(n) \in \Theta(n \log n)$
 d. $T(n) \in \Theta(n \log \log n)$
 e. $T(n) \in \Theta(n)$

W6Q3

Response Feedback: That's right. In this case we have $a=2$, $b=3$, and $d=1$. And indeed $2 < 3$.**Question 20**

1 out of 1 points



Order these seven functions, from smallest rate of growth to largest:

- Answers
 $3^n + n^2 \log n$
- Selected Answer
 1. $1000000 n$

$$\left(\frac{5}{2}\right)^n + \left(\frac{7}{3}\right)n^2 \quad 2. \quad n^3 + n^2 \log n$$

$$1000000 n \quad n^2 + n^3 \log n \quad 3.$$

$$(3n - 1)! \quad \left(\frac{7}{3}\right)^n + \left(\frac{5}{2}\right)n^2 \quad 4.$$

$$n^2 + n^3 \log n \quad \left(\frac{5}{2}\right)^n + \left(\frac{7}{3}\right)n^2 \quad 5.$$

$$n^3 + n^2 \log n \quad 3^n + n^2 \log n \quad 6.$$

$$\left(\frac{7}{3}\right)^n + \left(\frac{5}{2}\right)n^2 \quad 7. \quad (3n - 1)!$$

W2Q5

Response Feedback: Perfect! Well done.

Friday, 3 June 2016 3:23:17 PM EST

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