Mid-term Written Quiz

Due Oct 21, 2022 at 12:50pm **Points** 100 **Questions** 20
Available Oct 21, 2022 at 11:59am - Oct 21, 2022 at 1:05pm 1 hour and 6 minutes **Time Limit** None

Instructions

Please conform to Academic Honest rules.

This written quiz is closed book.

You cannot refer to any materials, either softcopy or hardcopy or internet.

This quiz is no longer available as the course has been concluded.

Attempt History

	Attempt	Time	Score
LATEST	Attempt 1	50 minutes	91 out of 100

Score for this quiz: **91** out of 100
Submitted Oct 21, 2022 at 12:49pm
This attempt took 50 minutes.

Question 1

3 / 3 pts

A splay tree is a binary search tree with the following balancing condition:

For each node *v*, the difference between the height of its left subtree and the height of its right subtree is not larger than 1.

- ○ True
- ◉ False

Correct!

Question 2

3 / 3 pts

The **level** of a node means the maximum length of the path from this node to a leaf in the tree.

- ○ True
- ◉ False

Correct!

Question 3

0 / 3 pts

The worst case running time of search() in a hash table with deletion is O(n) where n is the size of the hash table.

Correct Answer
- True

You Answered
- False

Question 4

3 / 3 pts

Minimax searches the game-tree in a DFS manner

Correct!
- True
- False

Question 5

3 / 3 pts

All operations (searching, insertion, deletion) in an AVL tree has the worst case complexity O(log n).

Correct!
- True
- False

Question 6

0 / 5 pts

With numbers 1,2,3,4,5,6, if you can do enqueue() 5 times (you can choose any 5 of the 6 numbers and do enqueue() in any order) and dequeue() twice. How many different contents can remain in an initially empty queue? (For example, 2,3,4 is possible, 3,4,6 is also possible)

You Answered: 20

Correct Answers: 120

Question 7

5 / 5 pts

The maximum number of nodes in a binary tree with height 9 is _____. (Please type an integer number in the following text box)

Correct!

1023

Correct Answers

1023

Question 8

5 / 5 pts

What is the value of the following prefix expression with all the operands being single digit?

+56*743-/

You Answered

37

Correct Answers

77

Question 9

5 / 5 pts

When using array representation for a binary tree and a node is at slot 14,

then the parent of this node is at slot _____.

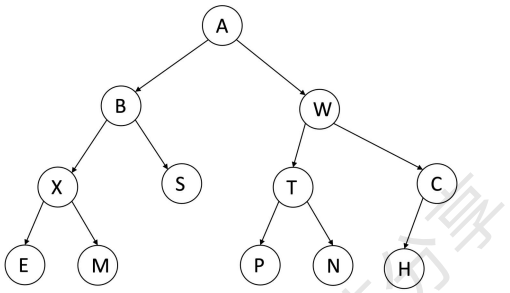
Correct!

- 7
- 6
- 5
- 8

Question 10

5 / 5 pts

The inorder traversal output for the following tree is _____.



- EMXSBPNTHCWA
- ABXEMSWTPNCH
- ABWXSTCEMPNH

Correct!

- EXMBSAPTNWHC

Question 11

5 / 5 pts

What is the running time of the following code?

```
Void function (int n)
{
    int i,j;
    int x=0;
    int y=0;
    for(i=0;i<n;i++)
    {
        If(x>100)
            for(j=0;j<n;j++)
                y--;
        else
                x--;

}
}
```

- O(nlogn)

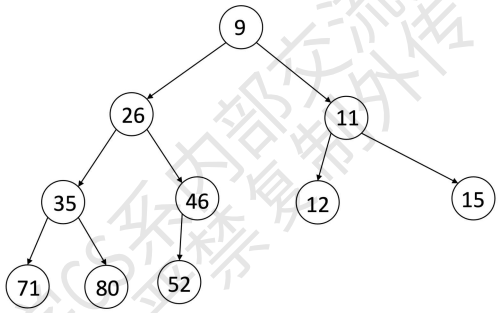
Correct!

- O(n)
- O(n^2)
- O(1)

Question 12

5 / 5 pts

After inserting 5 into the following heap (array representation), what is the data in the last non-empty slot of the array?



Correct!

- (●) 46
- ( ) 15
- ( ) 5
- ( ) 52

Question 13

5.5 / 5.5 pts

After inserting the following numbers one by one into a hash table of size 11 initially empty using quadratic probing, what are the numbers in each slot in the array (array index starts from 0)? If a slot does not store any number, please fill in 0.

4, 15, 8, 26, 3, 11

11 , 0 , 26 , 3 , 4 ,
15 , 0 , 0 , 8 , 0 ,
0

Answer 1:

Correct!

11

Answer 2:

Correct!

0

Answer 3:

Correct!

26

Correct! **Answer 4:** 3

Correct! **Answer 5:** 4

Correct! **Answer 6:** 15

Correct! **Answer 7:** 0

Correct! **Answer 8:** 0

Correct! **Answer 9:** 8

Correct! **Answer 10:** 0

Correct! **Answer 11:** 0

Question 14

4 / 5 pts

Please decide the O() for recursive relations below (All the initial T(k) with small k are 1)

Correct! **T(n)=T(n-2)+n** — O(n^2)

Correct! **T(n)=T(n-30)+15** — O(n)

You Answered **T(n)=2T(n/3)+n** — O(nlogn)

Correct Answer O(n)

Correct! **T(n)=nT(n-1)** — O(n!)

Correct! **T(n)=4T(n/2)+n^2** — O(n^2logn)

Other Incorrect Match Options:

- O(nlogn)

Question 15

9 / 9 pts

Given the following traversal sequences, please write down the postorder traversal of the corresponding binary tree:

Inorder: DBHEIAFCG

Preorder: ABDEHICFG

Postorder: D , H , I , E , B , F , G , C , A .

Answer 1:

Correct! D

Answer 2:

Correct! H

Answer 3:

Correct! I

Answer 4:

Correct! E

Answer 5:

Correct! B

Answer 6:

Correct! F

Answer 7:

Correct! G

Answer 8:

Correct! C

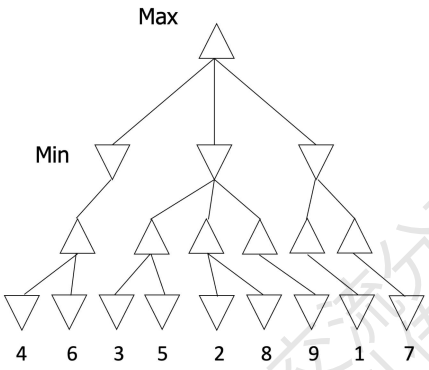
Answer 9:

Correct! A

Question 16

7 / 7 pts

Given the following two-player based game tree, when applying minimax with alpha-beta pruning, which leave nodes won't be searched?



Correct! ☑ leaf node with value 9

☐ leaf node with value 1

☐ leaf node with value 5

☐ leaf node with value 4

Correct! ☑ leaf node with value 8

Correct! ☑ leaf node with value 2

Correct! ☑ leaf node with value 7

Question 17

6 / 6 pts

Given 5 points forming a regular pentagon together with another point at the center of the pentagon (altogether 6 points), if you run Graham Scan to find the convex hull of these 6 points, you will do [11] pushes and [7] pops.

Answer 1:

Correct! 11

Answer 2:

Correct! 7

Question 18

6 / 6 pts

Find the best data structure for the following applications.

Correct! **Find the minimum number of a dynamically changing sequence (with possible insertions and deletions)** — Heap

Correct!	**Represent a polygon**	Doubly Circular Linked Lis
Correct!	**Find whether a sequence of '(' ')' is legally nested**	Stack
Correct!	**Build a dictionary**	Hash
Correct!	**Maintain a sequence of numbers with O(logn) for insertion, O(logn) for deletion and O(logn) for searching**	Balanced Binary Search T
Correct!	**Implement Round Robin Schedule**	Queue

Other Incorrect Match Options:
- Binary Tree

Question 19

4 / 4 pts

Which ones of the following are correct?

Correct! ☑ n(logn)^1000=o(n^2)

Correct! ☑ 100n^2=O(n^2)

☐ n^2+nlogn=O(nlogn)

☐ n^4=o(0.01^n)

Question 20

7.5 / 7.5 pts

Show the result of inserting the following sequence of elements into an initially empty AVL-tree:

{7, 13, 1, 6, 10, 33, 56, 30, 15}.

Assuming that the array representation is used for the tree, and if a slot in the array does not store any node, please fill in 0.

7	1	30	0	6	,
13	33	0	0	0	,
0	10	15	0	56	.

Answer 1:

Correct! 7

Answer 2:

Correct! 1

Answer 3:

Correct! 30

Answer 4:

Correct! 0

Answer 5:

Correct! 6

Answer 6:

Correct! 13

Answer 7:

Correct! 33

Answer 8:

Correct! 0

Answer 9:

Correct! 0

Answer 10:

Correct! 0

Answer 11:

Correct! 0

Answer 12:

Correct! 10

Answer 13:

Correct! 15

Answer 14:

Correct! 0

Answer 15:

Correct! 56

Quiz Score: **91** out of 100