

Week 7: PYQs

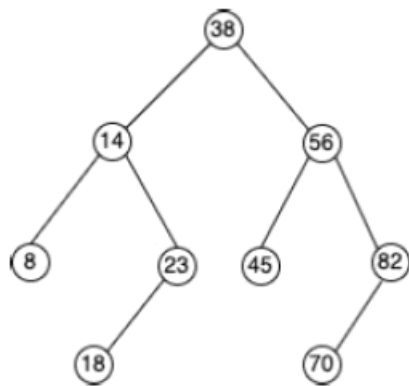
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Balanced Search Trees:

1. Quiz 2, Jan 24

Define the **slope** of a node as the absolute difference in height between the left subtree and the right subtree of the node. Consider that the height of the empty tree is 0.

Consider the below AVL Tree.



After inserting **19** in the given AVL tree (before applying rotation), which of the following node's slopes will become greater than 1? Select all that are correct.

Options :

- a. 38
- b. 56
- c. 14
- d. 18
- e. 23

2. End Term, Jan 24

Question Label : Multiple Choice Question

What is the maximum height of a AVL tree with **12** nodes? Consider that the height of the tree with single node is 1.

Options :

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Options:

- a. 4

- b. 5
- c. 3
- d. 7

3. Quiz 2, Sep 23

Question Label : Short Answer Question

What is the maximum possible height of an AVL tree containing **15** nodes? Consider that an AVL tree with a single node has a height of 1.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

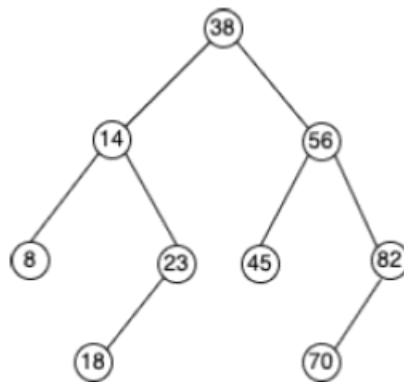
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Possible Answers :



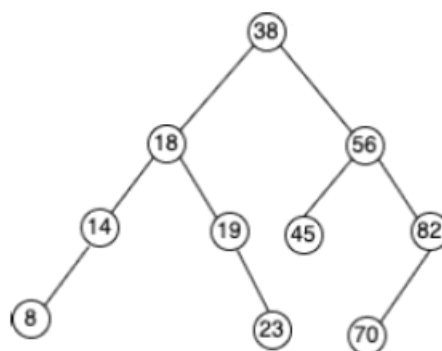
4. Quiz 2, Sep 23

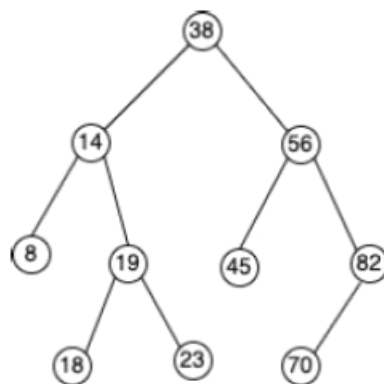
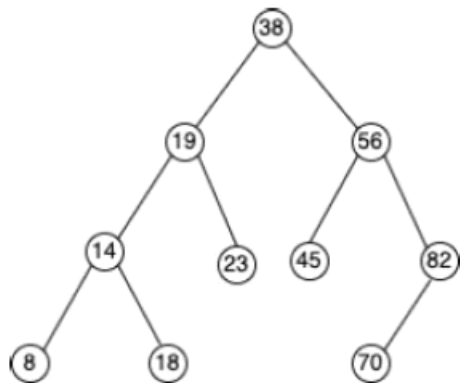
Consider the below AVL tree.



What is the updated AVL tree after inserting 19 in the given AVL tree?

Options :





None of these

5. End Term, Sep 23

Question Label : Short Answer Question

Let's take a sequence of elements **10, 6, 5, 12, 15, and 3** and insert these elements into an empty AVL tree in the given order. What would be the sum of elements stored in the leaf nodes of the Final AVL tree?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :



Interval Scheduling / Minimizing Lateness:

1. Quiz 2, Jan 24

You are given a list of 7 activities to be conducted in a single available room, each represented by (start time, end time). If any activity finishes at time T , then another activity can be started at time T or afterwards.

Activities: [(1, 4), (3, 5), (0, 2), (2, 3), (5, 8), (8, 9), (5, 7)]

How many activities can be scheduled at most by following the timing constraints given above?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :



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2. Quiz 2, Sep 23

Question Label : Multiple Choice Question

Suppose you have a set of jobs with their start and end times. If any job finishes at a time T , then the other job can be scheduled at a time T or afterward. Your goal is to find the maximum number of non-overlapping jobs that can be scheduled.

Which of the following greedy strategy can be used to solve this problem optimally?

Options :

6406532307442. ✖ Select jobs with the earliest start times first.

6406532307443. ✔ Select jobs with the earliest end times first.

6406532307444. ✖ Select jobs with the shortest duration first.

6406532307445. ✖ Select jobs with the longest duration first.

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3. End Term, Sep 23

You are given the following list of 8 meeting requests with start time, and end time.

Meeting Id	Start Time	End Time
1	1	4
2	6	12
3	2	8
4	11	15
5	3	7
6	5	10
7	9	14
8	13	16

Each meeting requires its own conference room. Your goal is to schedule all meetings in the minimum number of conference rooms. Assume that if any meeting ends at time t then another meeting can start at time t or afterwards in the same room.

The minimum number of conference rooms required to schedule all meetings is___.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :



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4. Quiz 2, Jan 24

You are given a list of 8 meetings, each represented by a tuple (start time, end time). Your goal is to schedule all meetings in the minimum number of conference rooms. If a meeting ends at time t in a conference room, another meeting can start at time t or afterwards in the same room.

Meetings: [(1, 4), (6, 12), (2, 8), (11, 15), (3, 7), (5, 10), (9, 14), (13, 16)]

The minimum number of conference rooms needed to schedule all meetings is__.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :



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5. End Term, May 23

Question Label : Short Answer Question

For an activity X , X_s is the starting time and X_e is the ending time. The following are the starting time and ending time of activities A, B, C, D, E, F, G and H given in chronological order.

$A_s, B_s, C_s, A_e, D_s, E_s, C_e, B_e, F_s, D_e, G_s, E_e, H_s, F_e, G_e, H_e$

What is the minimum number of rooms required to schedule the activities in a set of rooms such that there are no conflicts?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :



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Huffman Coding:

1. Quiz 2, Jan 24

Question Label : Multiple Select Question

For a set of symbols with probabilities of occurrence, which of the following statement(s) about the **Huffman tree** is/are correct?

Options :

6406532578256. ✓ Symbols with higher probabilities are generally closer to the root of the tree

6406532578257. ✗ Symbols with lower probabilities are generally closer to the root of the tree

6406532578258. ✗ The Huffman tree is always a complete binary tree

6406532578259. ✓ It generates prefix codes (no code is a prefix of another).

2. End Term, Jan 24

Question Label : Short Answer Question

An entire message is created using characters from the set $S = \{A, B, C, D, E\}$. The probability of occurrence of each character is given in the table below.

A	B	C	D	E
0.17	0.11	0.24	0.33	0.15

How many bits will be used to encode the message ABCDE using Huffman codes?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :



3. Quiz 2, Sep 23

Given the following set of characters and their frequencies:

Character	Frequency
A	80
B	60
C	50
D	40
E	30
F	20

Using Huffman coding, construct the Huffman tree for this set of characters. What is the total number of bits needed to represent the message ABCDEF?

Options :

- a. 15 bits
- b. 16 bits
- c. 17 bits
- d. 18 bits

4. End Term, Sep 23

Question Label : Multiple Choice Question

Let's take a sequence of letters with the below frequencies.

{'i': 26, 'j': 21, 'k': 16, 'l': 30, 'm': 7}

How many bits are required to encode the letter j in the Huffman code?

Options :

Options:

- a. 4
- b. 3
- c. 2
- d. 1

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