

## Test Questions

### Searching in a BST

Suppose that we have numbers between 1 and 100 in a binary search tree and we want to search for the number 37. Which of the following sequences could not be the sequence of nodes examined ?

- [68, 62, 93, 89, 34, 91, 37]
- [31, 82, 48, 44, 32, 43, 42, 38, 34, 36, 37]
- [71, 55, 21, 37]
- [68, 12, 55, 14, 27, 39, 29, 34, 37]

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### Inheritance

What should be the result of running the following pseudocode snippet?

```
class Class1:
    function function_1(self):
        print("a")

    function function_2(self):
        print("b")

class Class2:
    function function_1(self):
        print("b")

    function function_3(self):
        print("d")

class Class3:
    function function_2(self):
        print("e")

    function function_3(self):
        print("f")

class ClassA(Class3, Class1):
    function function_3(self):
        print("h")

class ClassB(Class2):
    function function_2(self):
        print("i")

    function function_3(self):
        print("j")

class ClassC(Class1):
    function function_2(self):
        print("k")

    function function_3(self):
        print("l")

ClassB().function_2()
ClassC().function_3()
ClassC().function_2()
```

ilk

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### System Safe State

A system has 18 magnetic tape drives and 5 processes : P1, P2, P3, P4, P5. The allocation of resources and the need for the resources by the processes are described in the table. Which of the following is possible **safe state** of the system?

Hint: A system is in a **safe state** if there is a sequence in which all the processes can be executed without getting into a **deadlock**.

processes	Need	Allocated
P1	11	0
P2	15	2
P3	10	2
P4	17	2
P5	13	0

[1, 3, 2, 4, 5]

[3, 2, 1, 5, 4]

[2, 3, 5, 1, 4]

[4, 2, 1, 3, 5]

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Not a topper

You are provided with a tables "**Students**" with their "name", "score" and respective "**country**" in a database.

### Students

ID	name	score	country
1	Aisha	292	US
2	Nabeel	284	CA
3	Wadood	292	CA
4	Maryam	326	US
5	Sohaib	272	CA
6	Noor	317	US

What names will the following query return?

**SELECT name FROM Students WHERE score IN (SELECT max(score) FROM Students GROUP BY country);**

Aisha,Sohaib,Wadood

Aisha,Maryam,Wadood

Maryam,Nabeel,Sohaib

Aisha,Maryam,Noor

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Make it a palindrome

How many iterations of characters are required to make **ciahfvrv** a palindrome string? Consider alphabets to be a circular list, A comes next to Z

41

38

29

49

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### Identical Stacks

Each row below are the stacks of water bottles with their respective heights(n)

1. | 3 | 1 | 4 | 4 |
2. | 5 | 3 | 4 | 4 | 3 | 5 | 1 | 2 |
3. | 4 | 4 | 5 | 1 | 3 | 5 | 1 | 1 |

The rightmost element shows the top of the stack. Adding up the heights of the bottles on a stack will give you the overall height of the stack. You can pop the bottles from each stack any number of times to change the height of the stack.

Determine the maximum height of each stack where all of the three stacks are equal in terms of height.

18

13

6

8

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### Process Scheduling

A CPU scheduler executes processes in time quantum of 100ms and then calculates the next process to execute after each quantum. 3 processes are fed into our CPU's process scheduler with the following attributes

Process A  
Arrival Time: 0  
Execution Time Needed: 1000msec

Process B  
Arrival Time: 600msec  
Execution Time Needed: 2000msec

Process C  
Arrival Time: 700msec  
Execution Time Needed: 700msec

There are four main algorithms which our CPU uses to schedule processes:  
FCFS: First Come First Serve  
SJF: Shortest Job First  
SRTF: Shortest Remaining Time First  
RR: Round Robin

If the scheduler is using the FCFS algorithm to schedule processes, which processes would have been completed after 3400 ms?

Answer as a comma separated list e.g. A,B or B,C,A

A,C

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### Hash Clash

An array is used here to represent a Hash Table. Array index starts from 0 and ends at **size\_of\_array - 1**  
Which slot would the number 37 hash to, in the following Hash Table?

**31**  **48**  **37**  **29**    **42**

size\_of\_table = 11

The hash function is :

*hash(number) : number % size\_of\_table*

For collision resolution use the following rehash function:

FOR COLLISION RESOLUTION USE THE FOLLOWING REHASH FUNCTION.

*new\_hash\_value : rehash(old\_hash\_value)*  
*rehash(position) : (position + 1) % size\_of\_table*

Enter slot number

6

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### Secret Key

```
INT mySecretKey(INT num)
{
    print<<num
    IF num < 13
    [
        mySecretKey( mySecretKey( mySecretKey( ++num ) ) )
    ]
    return (num)
}
```

The above psuedocode can generate a secret key for you. What would be the output secret key of the function mySecretKey(11)?

- The secret key is 111213131313
- The secret key is 12131313131313
- The secret key is 1112131313131313
- The secret key is 11121313131313

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### Die roll probability

A **6** sided die is rolled **4** times. What is the probability of getting all outcomes as unique?

- 0.82
- 0.28
- 0.89
- 0.91
- 0.65

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### Binary search steps counter

How many iterations of binary search are required to find **921** in [33, 64, 114, 119, 122, 161, 162, 168, 173, 213, 293, 296, 353, 356, 368, 494, 553, 566, 622, 648, 656, 752, 768, 771, 906, 921, 941, 996]?

- 1
- 7
- 9
- 5

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## Valid Binary Search Tree

Suppose that we have numbers between 1 and 100 in a binary search tree and we want to search for the number 94. Which of the following sequences could not be the sequence of nodes examined?

- [81, 79, 43, 34, 16, 11, 94]
- [94]
- [67, 87, 96, 93, 94]
- [15, 33, 34, 47, 88, 92, 93, 96, 94]

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## Character Analogies

**O** is to \_\_ what **M** is to **X**?

You can select only one option.

- C
- Z
- D
- I

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## Round robin scheduling

Round Robin is a CPU scheduling technique in which each process is assigned a fixed time slot(quantum) in a cyclic way consider the processes **p0, p1, p2, p3, p4** having arrival times **0, 3, 1, 1, 3** and burst times **3, 9, 4, 8, 3** respectively.

Suppose the time quantum = 2

**Process will complete in sequence with**

- p0,p2,p4,p1,p3
- p0,p2,p3,p4,p1
- p0,p2,p4,p3,p1
- p0,p2,p1,p3,p4

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## Customer orders

Find out the Customers (CustomerName, City) who have placed less than 19 orders.

Customers	Orders
CustomerID	OrderID
CustomerName	CustomerID
Address	ShipperID
City	OrderDate
PostalCode	

There is one correct option

- SELECT Customers.CustomerName, Customers.City, COUNT(Orders.OrderID) AS NumberOfOrders FROM Orders INNER JOIN Customers ON Orders.CustomerID = Customers.CustomerID GROUP BY CustomerName WHERE COUNT(Orders.OrderID) < 19 ORDER BY NumberOfOrders asc;
- SELECT Customers.CustomerName, Customers.City, Orders.OrderID AS NumberOfOrders FROM Orders, Customers WHERE Orders.CustomerID = Customers.CustomerID GROUP BY CustomerName ORDER BY NumberOfOrders asc HAVING COUNT(Orders.OrderID) < 19;
- SELECT Customers.CustomerName, Customers.City, COUNT(Orders.OrderID) AS NumberOfOrders FROM Orders INNER JOIN Customers ON Orders.CustomerID = Customers.CustomerID GROUP BY CustomerName ORDER BY NumberOfOrders asc HAVING COUNT(Orders.OrderID) > 19;
- SELECT Customers.CustomerName, Customers.City, COUNT(Orders.OrderID) AS NumberOfOrders FROM Orders WHERE Orders.CustomerID = Customers.CustomerID GROUP BY CustomerName HAVING NumberOfOrders < 19 ORDER BY NumberOfOrders asc;
- SELECT Customers.CustomerName, Customers.City, COUNT(Orders.OrderID) AS NumberOfOrders FROM Orders INNER JOIN Customers ON Orders.CustomerID = Customers.CustomerID GROUP BY CustomerName HAVING COUNT(Orders.OrderID) < 19 ORDER BY NumberOfOrders asc;

Submit

You have used 0 of 1 attempt

## Min Heap

A **min-heap** is a heap where the value of each internal node is smaller than or equal to the values of its children. Consider a binary **min-heap** implemented using an array as follows: The root is stored in the first location, **a[0]**, nodes in the next level, from left to right, is stored from **a[1]** to **a[2]**. The nodes from the second level of the tree from left to right are stored from **a[3]** location onward... Which one of the following array represents a binary min-heap?

There is one correct option

- 10, 18, 27, 45, 94, 29, 109, 136, 120, 160, 132, 102, 113, 133, 126
- 10, 18, 27, 45, 94, 120, 136, 109, 29, 160, 132, 102, 113, 133, 126
- 10, 18, 27, 29, 136, 160, 109, 102, 45, 120, 94, 132, 113, 133, 126
- 10, 18, 27, 45, 94, 102, 160, 120, 136, 29, 132, 109, 113, 133, 126

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## Another Linked List

Let's assume we have a singly linked lists: **Z->H->B->Q->L->E->W->A->S**. What would be the output and resultant list after running **func(list.head, 7)**. NOTE: This function is written in some hypothetical language and you can assume it's syntactically correct.

```
function List func(head, i) {
    if (i == 0) {
        temp = head.next;
        return temp;
    }

    head.next = func(head.next, i-1)
    print head.data
}
```

- Output:** WELQBHZ List: Z->H->B->Q->L->E->W->S
- Output:** WELQBHZ List: Z->H->B->Q->L->E->W->A->S
- Output:** WELQBHZ List: S->W->E->L->Q->B->H->Z
- Output:** ZHBQLEW List: Z->H->B->Q->L->E->W->S

Submit

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## XOR and XNOR

Let A : "01111010" , B=? , If { A (Ex-nor) B } is a resultant string of **ALTERNATE ZEROES** [ 01010101 ] then:

11110010

11111010

11110101

**Submit**

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## Stacks and Queues

There are two storage systems present, one is a stack and the other queue. The content of the stack is **[9, 7]** and the content of the queue is **[27, 26, 18, 25, 17, 23, 24, 15, 20, 21]** (the first item in both represent the first item stored). The number on each item represent the ID of item.

We have to balance these storage systems (move items between storages so that there are equal number of items in both). Keeping in mind the functionalities of stacks and queues, we have to balance them!

STACK STORAGE: *oldest* **[9, 7]** *newest*

QUEUE STORAGE: *oldest* **[27, 26, 18, 25, 17, 23, 24, 15, 20, 21]** *newest*

### What is the newest item in stack storage after balancing the storages?

You can select only one option.

9

15

25

7

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## Employee salaries

### Table: employee\_age

emp_id	age
100	25
103	29
102	36
101	37

### Table: employee\_salary

emp_id	salary
106	75000
102	50000
103	35000
105	45000

With given tables what would be output of following SQL query:

```
SELECT
    MIN(eSal.salary)
FROM
    employee_age as eAge INNER JOIN employee_salary as eSal
ON
    eAge.emp_id = eSal.emp_id

    WHERE eAge.age > 25
GROUP BY eAge.emp_id
HAVING MIN(eSal.salary) > 35000
```

75000

50000 35000 45000**Submit**

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### Inheritance Code Snippet

What will be the output of this code snippet? (`__init__` is constructor of class)

```
class A:
    def __init__(self):
        self.calc_i(782)

    def calc_i(self, i):
        self.i = 2 * i

class B(A):
    def __init__(self):
        super().__init__()
        print("i from B is", self.i)

    def calc_i(self, i):
        self.i = 26 * i

b = B()
```

You can select only one option.

 23336 19337 20332 39927**Submit**

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### Mode, mean, median

M = [37, 2, 12, 12, 'N']

What is the value of N if the mode, mean and median of the list M are equal to each other? Express your answer to the nearest whole number.

Note:

- The mode of a set of data values is the value that appears most often.
- The mean is the average of the numbers: a calculated "central" value of a set of numbers.
- Median is the middle number in a sorted list of numbers.

12

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### John Wick's profession

John Wick has lost his memory in a car accident, sadly. But there is one help you can do for John Wick. Help him recall who he is.

#### Hint:

If you get more 1's than 0's, John Wick is a doctor.

If you get more 0's than 1's, John Wick is a plumber.

If you get equal number of 1's and 0's, John Wick is a carpenter.

```
function foo()
    print 1
```

```

function soo()
  print 0

function zoo()
  foo()
  soo()

function koo()
  foo()
  soo()
  soo()

function loo()
  foo()
  foo()
  soo()

```

If the functions run in the following order, tell who is John Wick?

loo(), loo(), loo(), soo(), zoo(), loo(), zoo(), zoo(), koo()

- I am unable to help John Wick.
- John Wick is a carpenter.
- John Wick is a doctor.
- John Wick is a plumber.

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### Round and round

We have come upon a 'longRunning' method in our code. In order to check its lengthy execution time, we are calculating its iterations it against different inputs.

Can you figure out the number of iterations it will take to execute the following input:

**[9, 9, 17, 20]**

```

function longRunningFunction(array) {
  for ( i = 0; i < length(array); i++ ) {
    idx = i
    for ( j = i + 1; j < length(array); j++ ) {
      if ( array[idx] > array[j] ) {
        idx = j
      }
    }
    swap( array[i], array[idx] )
  }
}

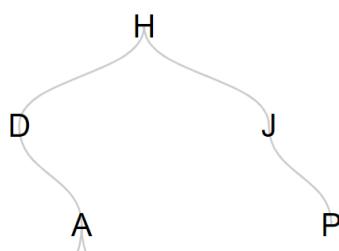
```

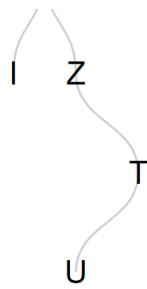
- 4
- 6
- 1
- 1

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### Binary Tree Traversal

What is the in-order traversal of the following binary tree?





Answer (e.g. ARBISOFT)

You have used 0 of 1 attempt

### The queue and the stack

Consider a circular queue and a stack of size 5 and 7 respectively. Circular queue also performs following operations:

1. After Enqueue(x):

- Push(x)
- Push(x mod 3)

2. After x = Dequeue():

- y = Pop()
- Push(x + y)

What will be the representation of stack after performing following operations:

enqueue ue(6)	enqueue ue(7)	dequeue ue()	enqueue e(13)	enqueue e(19)	enqueue e(15)	dequeue ue()	dequeue ue()	enqueue e(17)
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[6, 7, 13, 19, 15, 17]

[6, 3, 8, 8, 14, 2, 40]

[6, 5, 9, 9, 15, 3, 41]

None of the above

[6, 0, 7, 7, 13, 1, 39]

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### Novel Arrangement

Anaya has three Urdu novels (**C, F, E**) and Four English novels (**A, B, D, G**). She wants to arrange her novels in a way that following conditions must be met:

- No english novel can be placed immediate after another english novel.
- E must be placed earlier than D.
- B and D must be separated from each other by at least one novel.
- B must be placed immediately before or after C.
- C must be placed immediately after A, but not if F is placed earlier than A.

Choose the best sequence of novels:

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

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

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

- G, F, A, E, B, C, D

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### Max Heap

What will be the max heap of the following heap:

[22, 29, 28, 30, 41, 49, 34, 41, 29]

- [49, 41, 41, 34, 30, 29, 29, 28, 22]

- [49, 41, 34, 30, 41, 28, 29, 29, 22]

- [22, 28, 29, 41, 29, 49, 41, 34, 30]

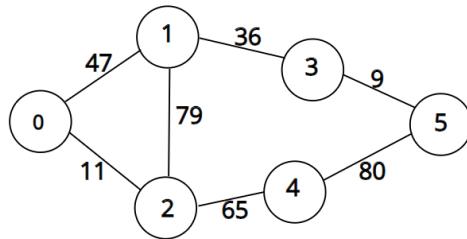
- [49, 41, 34, 30, 41, 28, 22, 29, 29]

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### Graph adjacency

If we represent the following undirected graph in adjacency matrix **M** what would be the sum of **2nd** row of **M**.

NOTE: Counting starts from 0 as (0th, 1st, 2nd, 3rd, 4th, 5th ...)



- 145

- 155

- 45

- 162

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### Profit Issues

**A, B** and **C** enter into a partnership with an investment in which **A**'s contribution is **\$4000**. if out of a total profit of **\$1200**, A and B get **\$500** and **\$100** respectively, then what is **C**'s capital?

- 4600.0

- 5150.0

- 4850.0

- 4800.0

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