# Euler Motors Internship Test DTU(Software)

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## Basics of Programming

What will be the output of the following code? 2 points

```
#include <iostream>
using namespace std;

int main() {
    int arr[5] = {1, 2, 3, 4, 5};
    cout << arr[5];
    return 0;
}
```

- ○ 5
- ○ 1
- ◉ Compilation Error
- ○ Runtime Error

Clear selection

What will be the value of x after executing the following code snippet? 2 points

```
#include <iostream>
using namespace std;

int main() {
    int x = 10;
    x++;
    ++x;
    cout << "x is " << x;
    return 0;
}
```

- x is 11
- x is 12
- x is 10
- Compilation Error

What does the following code snippet output? 2 points

```
#include <iostream>
using namespace std;

int main() {
    int arr[3];
    cout << arr[2];
    return 0;
}
```

- 0
- Garbage Value
- Compilation Error
- Runtime Error

Which of the following is not a valid variable name in C++? 2 points

- my_variable
- MyVariable
- 2variable
- _variable

What will be the output of the following code snippet? 2 points

```
#include <iostream>
using namespace std;

int main() {
    int x = 5, y = 10;
    cout << (x > y ? x : y);
    return 0;
}
```

- 5
- 10
- Compilation Error
- Runtime Error

Which of the following is the correct syntax to declare a function in C++? 2 points

- function myFunction(int x, int y) { }
- void myFunction(int x, int y) { }
- myFunction(int x, int y) { }
- int myFunction(int x, int y);

Which operator is used for dynamic memory allocation in C++? 2 points

- new
- malloc
- alloc
- create

What is the output of the following code snippet? 2 points

```
#include <iostream>
using namespace std;

int main() {
    int x = 5;
    int &ref = x;
    ref++;
    cout << x;
    return 0;
}
```

- 5
- 6
- Compilation Error
- Runtime Error

What will be the output of the following code snippet? 2 points

```
#include <iostream>
using namespace std;

int main() {
    int x = 5;
    int *ptr = &x;
    cout << ptr;
    return 0;
}
```

- Address of x
- 5
- Compilation Error
- Runtime Error

What is the time complexity of searching an element in a binary search tree? 2 points

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

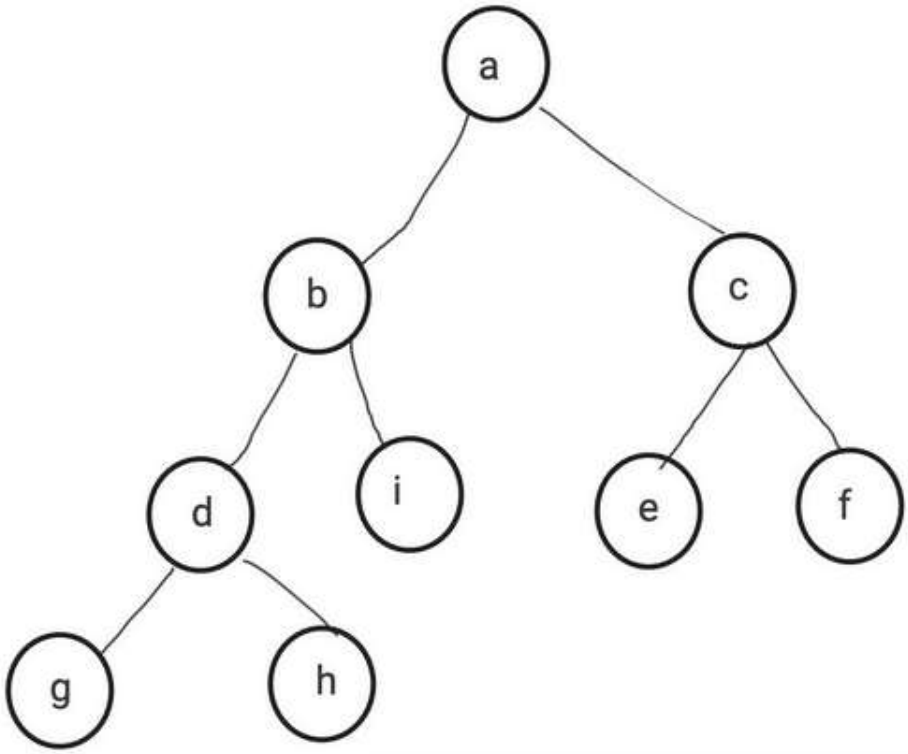
Which data structure is best suited for implementing LIFO (Last In First Out) behavior? 2 points

- Queue
- Stack
- Linked List
- Binary Tree

Which data structure is typically used for implementing priority queues? 2 points

- Stack
- Queue
- Linked List
- Heap

Please select all true statements from the below options for the given Binary Tree. 4 points




- a,b,d,g,h,i,c,e,f is the PostOrder Traversal
- g,d,h,b,i,a,c,e,f is the InOrder Traversal
- g,d,h,b,i,a,e,c,f is the InOrder Traversal
- g,h,d,i,b,e,f,a,c is the PostOrder Traversal

What is the purpose of hashing in data structures? 2 points

- To sort elements
- To retrieve elements in sorted order
- To map data to keys for efficient retrieval
- To store elements in a tree structure

What is the main advantage of using a linked list over an array? 2 points

- Constant time access to elements
- Efficient insertion and deletion of elements
- Fixed size
- Elements stored in contiguous memory locations

What is the time complexity of finding an element in a hash table with a good hash function? 2 points

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

What is the output of the following code snippet? 2 points

```
#include <iostream>
using namespace std;

void printDigits(int n) {
    if (n == 0)
        return;
    printDigits(n / 10);
    cout << n % 10 << " ";
}

int main() {
    printDigits(123);
    return 0;
}
```

- 1 2 3
- 3 2 1
- 1 3 2
- Compilation Error

What is the time complexity of the following recursive function? 2 points

```cpp
#include <iostream>
using namespace std;

int fibonacci(int n) {
    if (n <= 1)
        return n;
    return fibonacci(n - 1) + fibonacci(n - 2);
}

int main() {
    cout << "10th Fibonacci number: " << fibonacci(10) << endl;
    return 0;
}
```

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

What is the time complexity of the following sorting algorithm? 4 points

```cpp
#include <iostream>
#include <vector>
using namespace std;

void insertionSort(vector<int>& arr) {
    int n = arr.size();
    for (int i = 1; i < n; i++) {
        int key = arr[i];
        int j = i - 1;
        while (j >= 0 && arr[j] > key) {
            arr[j + 1] = arr[j];
            j = j - 1;
        }
        arr[j + 1] = key;
    }
}

int main() {
    vector<int> vec = {3, 1, 4, 2, 5};
    insertionSort(vec);
    cout << "Sorted Array: ";
    for (int num : vec) {
        cout << num << " ";
    }
    return 0;
}
```

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

Which data structure is used for implementing recursion? 2 points

- Stack
- Queue
- List
- Array

The data structure required for Breadth First Traversal on a graph is? 2 points

- Array
- Stack
- Tree
- Queue

What is the main difference between a depth-first search (DFS) and a breadth-first search (BFS) in a graph? 2 points

- DFS uses a queue while BFS uses a stack.
- DFS explores as far as possible along each branch before backtracking, while BFS explores all neighbors at the present depth before moving on to nodes at the next depth level.
- BFS uses recursion while DFS does not.
- DFS is used only for weighted graphs while BFS is used for unweighted graphs.

Which algorithm is used to find the shortest path in an unweighted graph? 2 points

- Dijkstra's algorithm
- Bellman-Ford algorithm
- Floyd-Warshall algorithm
- Breadth-First Search (BFS)

What is the time complexity of the merge sort algorithm? 2 points

- O(n)
- O(n log n)
- O(n^2)
- O(2^n)

What does the following bash script do? 2 points

```
#!/bin/bash
for file in *.txt; do
  mv "$file" "${file%.txt}.bak"
done
```

- Deletes all .txt files in the directory
- Renames all .txt files to .bak
- Archives all .txt files in the directory
- Searches for .txt files and prints their names

Which of the following scheduling algorithms can lead to starvation? 2 points

- First-Come-First-Serve (FCFS)
- Round Robin (RR)
- Priority Scheduling
- Shortest Job Next (SJN)

Which of the following is true about deadlocks? 2 points

- A. They always occur when multiple processes share resources
- B. Deadlocks can occur when the four necessary conditions (mutual exclusion, hold and wait, no preemption, circular wait) are satisfied
- C. They can be resolved automatically by modern operating systems
- D. Deadlocks only occur in distributed systems

What does the following bash script print when executed? 2 points

```
#!/bin/bash
echo $(( (5 + 3) * 2 ))
```

- A. 13
- B. 16
- C. 10
- D. Syntax Error

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