Wednesday 3/2/22

Long video: 10 interview questions: https://www.youtube.com/watch?v=Peq4GCPNC5c
Big O (basic): https://www.youtube.com/watch?v=v4cd1O4zkGw&t=52s
Big O: https://www.youtube.com/watch?v=__vX2sjlpXU
10 concepts for interviews: https://www.youtube.com/watch?v=r1MXwyiGi_U
Merge sort time complexity: https://www.youtube.com/watch?v=FtyINecvfnA&t=305s

HW6:

1	1. What is Inheritance in C++? a) Wrapping of data into a single class b) Deriving new classes from existing classes c) Overloading of classes d) Classes with same names 2. How many specifiers are used to derive a class? a) 1 b) 2 c) 3 d) 4 3. Which specifier makes all the data members and functions of base class inaccessible by the derived class? a) private b) protected c) public d) both private and protected 4. If a class is derived privately from a base class then _____ a) no members of the base class is inherited b) all members are accessible by the derived class c) all the members are inherited by the class but are hidden and cannot be accessible d) no derivation of the class gives an error 5. What will be the output of the following C++ code? #include <iostream> #include <string> using namespace std; class A {

```
        int a, b;
        float d;
  public:
        void change(int i){
                a = i;
        }
        void value_of_a(){
                cout<<a;
        }
};

class B: private A
{

};

int main(int argc, char const *argv[])
{
        B b;
        cout<<sizeof(B);
        return 0;
}
```

a) 8
b) 12
c) Error
d) Segmentation fault

6. What will be the output of the following C++ code?

```
#include <iostream>
#include <string>
using namespace std;
class A
{
        float d;
   public:
        int a;
        void change(int i){
                a = i;
        }
        void value_of_a(){
                cout<<a;
        }
};

class B: public A
{
        int a = 15;
   public:
```

```
        void print(){
                cout<<a;
        }
};

int main(int argc, char const *argv[])
{
        B b;
        b.change(10);
        b.print();
        b.value_of_a();

        return 0;
}
```

a) 1010
b) 1510
c) 1515
d) 5110

7. What will be the output of the following C++ code?

```
#include <iostream>
#include <string>
using namespace std;
class A
{
        float d;
  public:
        A(){
                cout<<"Constructor of class A\n";
        }
};

class B: public A
{
        int a = 15;
   public:
        B(){
                cout<<"Constructor of class B\n";
        }
};

int main(int argc, char const *argv[])
{
        B b;
        return 0;
}
```

a)

Constructor of class A
Constructor of class B
b) Constructor of class A
c) Constructor of class B
d)

Constructor of class B
Constructor of class A

8. What is a virtual function in C++?
a) Any member function of a class
b) All functions that are derived from the base class
c) All the members that are accessing base class data members
d) All the functions which are declared in the base class and is re-defined/overridden by the derived class

9. Which is the correct syntax of declaring a virtual function?
a) virtual int func();
b) virtual int func(){};
c) inline virtual func();
d) inline virtual func(){};

10. What will be the output of the following C++ code?

```
#include <iostream>
#include <string>
using namespace std;
class A{
        float d;
  public:
        virtual void func(){
                cout<<"Hello this is class A\n";
        }
};

class B: public A{
        int a = 15;
public:
        void func(){
                cout<<"Hello this is class B\n";
        }
};

int main(int argc, char const *argv[])
{
        B b;
        b.func();
```

```
        return 0;
}
```
a) Hello this is class B
b) Hello this is class A
c) Error
d) Segmentation fault

11. What will be the output of the following C++ code?

```
#include <iostream>
#include <string>
using namespace std;
class A
{
        float d;
    public:
        virtual void func(){
                cout<<"Hello this is class A\n";
        }
};

class B: public A
{
        int a = 15;
  public:
        void func(){
                cout<<"Hello this is class B\n";
        }
};

int main(int argc, char const *argv[])
{
        A *a;
        a->func();
        return 0;
}
```
a) Hello this is class A
b) Hello this is class B
c) Error
d) Segmentation Fault

12. What will be the output of the following C++ code?

```
#include <iostream>
#include <string>
using namespace std;
class A
{
```

```
        float d;
  public:
        virtual void func(){
                cout<<"Hello this is class A\n";
        }
};

class B: public A
{
        int a = 15;
  public:
        void func(){
                cout<<"Hello this is class B\n";
        }
};

int main(int argc, char const *argv[])
{
        A *a = new A();
        B b;
        a = &b;
        a->func();
        return 0;
}
```

a) Hello this is class A
b) Hello this is class B
c) Error
d) Segmentation Fault

13. Which statement is incorrect about virtual function.
a) They are used to achieve runtime polymorphism
b) They are used to hide objects
c) Each virtual function declaration starts with the virtual keyword
d) All of the mentioned

14. The concept of deciding which function to invoke during runtime is called _____
a) late binding
b) dynamic linkage
c) static binding
d) both late binding and dynamic linkage

15. What is a pure virtual function?
a) A virtual function defined inside the base class
b) A virtual function that has no definition relative to the base class
c) A virtual function that is defined inside the derived class
d) Any function that is made virtual

2	Given an integer array nums, return the greatest common divisor of the smallest number and largest number in nums. The greatest common divisor of two numbers is the largest positive integer that evenly divides both numbers. Example 1: Input: nums = [2,5,6,9,10] Output: 2 Explanation: The smallest number in nums is 2. The largest number in nums is 10. The greatest common divisor of 2 and 10 is 2. Example 2: Input: nums = [7,5,6,8,3] Output: 1 Explanation: The smallest number in nums is 3. The largest number in nums is 8. The greatest common divisor of 3 and 8 is 1. Example 3: Input: nums = [3,3] Output: 3 Explanation: The smallest number in nums is 3. The largest number in nums is 3. The greatest common divisor of 3 and 3 is 3. Constraints: 2 <= nums.length <= 1000 1 <= nums[i] <= 1000
3	Given an integer n, return the number of prime numbers that are strictly less than n. Example 1: Input: n = 10 Output: 4

	Explanation: There are 4 prime numbers less than 10, they are 2, 3, 5, 7. Example 2: Input: n = 0 Output: 0 Example 3: Input: n = 1 Output: 0 Constraints: 0 <= n <= 5 * 106
4	You are given nums, an array of positive integers of size 2 * n. You must perform n operations on this array. In the ith operation (1-indexed), you will: Choose two elements, x and y. Receive a score of i * gcd(x, y). Remove x and y from nums. Return the maximum score you can receive after performing n operations. The function gcd(x, y) is the greatest common divisor of x and y. Example 1: Input: nums = [1,2] Output: 1 Explanation: The optimal choice of operations is: (1 * gcd(1, 2)) = 1 Example 2: Input: nums = [3,4,6,8] Output: 11 Explanation: The optimal choice of operations is: (1 * gcd(3, 6)) + (2 * gcd(4, 8)) = 3 + 8 = 11 Example 3: Input: nums = [1,2,3,4,5,6] Output: 14 Explanation: The optimal choice of operations is: (1 * gcd(1, 5)) + (2 * gcd(2, 4)) + (3 * gcd(3, 6)) = 1 + 4 + 9 = 14 Constraints:

	1 <= n <= 7 nums.length == 2 * n 1 <= nums[i] <= 106
5	Given an array nums of positive integers. Your task is to select some subset of nums, multiply each element by an integer and add all these numbers. The array is said to be good if you can obtain a sum of 1 from the array by any possible subset and multiplicand. Return True if the array is good otherwise return False. Example 1: Input: nums = [12,5,7,23] Output: true Explanation: Pick numbers 5 and 7. 5*3 + 7*(-2) = 1 Example 2: Input: nums = [29,6,10] Output: true Explanation: Pick numbers 29, 6 and 10. 29*1 + 6*(-3) + 10*(-1) = 1 Example 3: Input: nums = [3,6] Output: false Constraints: 1 <= nums.length <= 10^5 1 <= nums[i] <= 10^9