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- 1) Following are the different classes for file handling, which of them is the class that contains the method to write in a file in JAVA?

a) FileStream **b)FileInputStream** c)BufferedInputStream d)FileBufferStream

-> Java FileInputStream class obtains input bytes from a [file](#). It is used for reading byte-oriented data (streams of raw bytes) such as image data, audio, video etc. You can also read character-stream data.

- 2) If we want to prevent any method from overriding in JAVA, we declare the method as,

(a) static (b) const **(c) final** (d) abstract (e) none of the above.

-> You can prevent a class from being subclassed by using the `final` keyword in the class's declaration. Similarly, you can prevent a method from being overridden by subclasses by declaring it as a final method.

- 3) Which of the following is not true in JAVA?

- (a) An interface can extend another interface.
- (b) A class which is implementing an interface must implement all the methods of the interface.
- (c) An interface can implement another interface.**
- (d) An interface is a solution for multiple inheritance in java.
- (e) None of the above.

-> An interface cannot implement another interface, making Option C the correct answer.

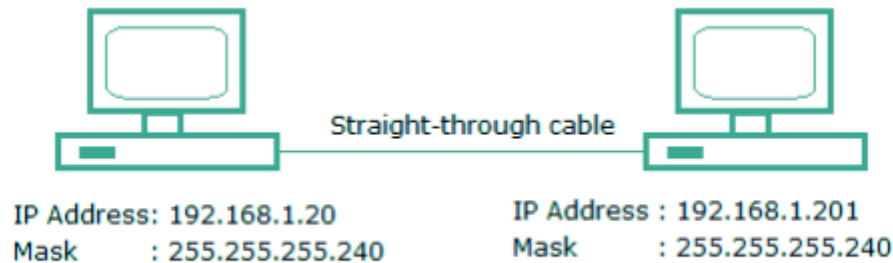
- 4) What connects IP address to the Physical address of devices?

a) **ARP** b) ICMP c) TCP d) UDP

-> ARP - Address Resolution Protocol is responsible for finding the destination's MAC address using source & destination IP and source MAC address.

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- 5) Consider yourself as a Network admin, you are trying to connect two hosts A&B directly through their ethernet interfaces as shown in the image. Ping attempts are getting unsuccessful between them. What can you do to ensure there is connectivity?



- 1) Crossover cable should be used in place of straight through cable.
- 2) Rollover cable should be used in place of straight through cable.
- 3) Subnet masks should be set to 255.255.255.192
- 4) A default gateway needs to be set on each host.
- 5) Subnet masks should be set to 255.255.255.0

a) 1 only b) 2 only c) 3 & 4 only d) 2 & 5 only **e) 1 & 5 only**

-> First, if you have two hosts directly connected, as shown in the graphic, then you need a crossover cable. A straight-through cable won't work. Second, the hosts have different masks, which puts them in different subnets. The easy solution is just to set both masks to 255.255.255.0 (/24).

- 6) You want to implement an application in which you are going to use Telnet or FTP, what is the highest layer you are using to transmit data ?

a) **Application** b) Presentation c) Session d) Transport

-> Both FTP and Telnet use TCP at the Transport layer; however, they both are Application layer protocols, so the Application layer is the best answer.

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7) What is difference between docker stop & docker kill ?

a)Both are same in terms of their implementation.

b)Their internal implementation uses different hardware signals

c)docker kill removes all allocated resources but docker stop doesn't

d)docker stop keeps the container on hold unlike docker kill

-> Docker stop uses SIGTERM and Docker kill use SIGKILL signal, also docker kill instantly removes all resources given to a container, but docker stop waits for ongoing process to get completed.

8) Multiple containers running on a single machine all share the same resources such as the operating system kernel for instant boot and efficient utilization of RAM. True or False?

a)True b)False

9) In 64 bit architecture machine

```
#include<iostream>
```

```
using namespace std;
```

```
struct student{
```

```
int a; char b; char c;
```

```
};
```

```
int main()
```

```
{
```

```
cout<<sizeof(student);
```

```
return 0;
```

```
}
```

(A) 4 (B) 6 (C) 8 **(D) 12**

-> int 4 bytes + char (1 +3) + char (1 +3)

total = 12bytes;

10) Which of the following feature of OOPs is not used in the following C++ code?

```
class A{
    int i;
    public:
    void print() {cout << "hello" << i;}
}
class B : public A {
    int j;
    public:
    void assign (int a ) {k = a;}
}
```

- a) Abstraction b) Encapsulation c) Inheritance **d) Polymorphism**

-> As i and j members are private i.e. they are hidden from outer world therefore we have used the concept of abstraction. Next data members and there related functions are put together into single class therefore encapsulation is used. Also as class B is derived from A therefore Inheritance concept is used. But as no function is overloaded in any of the classes therefore, the concept of polymorphism is missing here.

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

```
#include<iostream>

using namespace std;

int main()
{
    int x = 5;

    auto check = []() -> bool
    {
        if(x == 0)

            return false;
```

```
else  
    return true;  
};  
  
cout<<check()<<endl;  
  
return 0;  
  
}
```

- a) 1
- b) 0
- c) Error**
- d) Segmentation fault

-> The above code gives an error because x is neither passed as a parameter in lambda expression nor it is declared as a local variable inside the expression. So the only x that will be referred is the outside x but as the lambda expression does not capture any variable, therefore, it is also not allowed to access the external variable x hence as variable x is not defined therefore the program gives the error.

12) Tarak Mehta sold a pair of Tshirt and jeans at 25% profit. The profit obtained on Tshirt was 20%. Had he reduced the both cost price of the Tshirt and selling price of the Tshirt by Rs. 200, his profit on the pair would have risen to 30%. Earlier cost price of the jeans was Rs.80 less than half of the selling price of the Tshirt. What price should he mark on a pair of Tshirt and jeans to earn a profit of 50%?

- 1. Rs. 1680
- 2. Rs. 1800**
- 3. Rs. 2420
- 4. Rs. 2740

->Let Cost price of each Tshirt = s

Cost price of each Jeans = p

Selling price of each Tshirt = h

And, Selling price of each Jeans = a

From question

$$h + a = 1.25 (s + p) \dots\dots(i)$$

$$h = 1.2s \dots\dots (ii)$$

$$(h + a - 200) = 1.3 (s + p - 200) \dots\dots (iii)$$

$$\text{And, } p = \frac{h}{1.2} - 80 \dots\dots\dots (iv)$$

Solving the above system of equation we get,

$$s = 800, p = 400, h = 960 \text{ and, } a = 540$$

$$\text{Total cost price of a pair of Tshirt and jeans} = 800 + 400 = 1200$$

$$\text{Required marked price} = 1200 \times 1.5 = \text{Rs.1800}$$

Hence, option (B) is correct.

13) A and B can complete a work in 24 days and B and C together can complete the same work in 30 days. A and C together work for 15 days and after 15 days A and C left the work, remaining work done by alone B. If the efficiency ratio of A and B is 2 : 3, then find in how many days total work will be completed ?

1. 28 days

2. 60 days
3. **40 days**
4. 38 days

-> LCM of 24 and 30 = 120

total work = 120

efficiency of A and B = $120/24 = 5$

efficiency of B and C = $120/30 = 4$

efficiency of A = $5 * 2/5 = 2$

efficiency of B = $5 - 2 = 3$

efficiency of C = $4 - 3 = 1$

A and C together work for 15 days = $(2 + 1) * 15 = 45$

remaining work = $120 - 45 = 75$

days required to complete remaining work = $75/3 = 25$ days

total days = $15 + 25 = 40$ days

14) 5, 11, 35, 143, 719, ?

1. 4240
2. **4319**
3. 4465
4. 4978

->The series is, $(* 2 + 1), (* 3 + 2), (* 4 + 3), (* 5 + 4), (* 6 + 5),$

15) The Git clone command does which of the following?

- A. Makes a local copy of the repository
- B. Creates a working directory
- C. Commits a new branch
- D. Both 1 & 2**

16) Which command removes a directory from directory stack?

- a) dirs
- b) popd**
- c) pushd
- d) rm

17) What is the least number of digits in the number formed from only zeroes and ones such that the number is divisible by 225?

1. 4 2. 9 **3. 11** 4. 7

-> Approach : $225 = 9 * 25$ For the number to be divisible by 225 it has to be divisible by both 9 and 25. For divisibility by 25, the last two digits should be zeroes or they should form a number which is multiple of 25. Hence we need 2 zeroes. For divisibility by 9, the sum of digits should be a multiple of 9. Only ones contribute to sum, and the least multiple of 9 is 9 itself; hence 9 ones. So, the number should have 9 ones and 2 zeroes or 11 digits.

18) A contractor agreed to construct a 6 km road in 200 days. He employed 140 persons for the work. After 60 days, he realized that only 1.5 km road has been completed. How many additional people would he need to employ in order to finish the work exactly on time?

1. 60 **2. 40** 3. 35 4. 25

->

	Men	Tunnel	Days
Initial	140	1.5 km	60
Remaining	X	4.5 km	140

$$X = 140 \times 4.5 / 1.5 \times 60 / 140 = 180$$

$$\text{Additional men required} = 180 - 140 = 40$$

19) An alloy is prepared by mixing three metals A, B and C in the proportion 3: 4: 7 by volume. Weights of the same volume of the metals A, B and C are in the ratio 5: 2: 6. In 130 kg of the alloy, the weight, in kg, of the metal C is

1. 70 2. 96 3. 48 **4. 84**

$$\rightarrow \text{Required weight of C} = (7 \times 6 / (3 \times 5 + 4 \times 2 + 7 \times 6)) \times 130 = 84$$

20) Which of the following is correct?

```
class Book:
    def __init__(self, author):
        self.author=author
book1=Book ("V.M. Shah")
book2=book1
```

A. Both book1 and book2 will have reference to two different objects of class Book.

B. id(book1) and id(book2) will have same value.

C. It will throw error as multiple references to same object is not possible.

D. None of the above

-> book1 and book2 will reference to the same object. Hence, id(book1) and id(book2) will have same value

21)

class A:

```
def __init__(self,num):
```

```
    num=3
```

```
    self.num=num
```

```
def change(self):
```

```
    self.num=7
```

```
a=A(5)
```

```
print(a.num)
```

```
a.change()
```

```
print(a.num)
```

a) A. 5 7 B. 5 5 C. 3 3 **D. 3 7**

-> Inside constructor, self.num=3. First print statement prints 3. As, method change() is invoked, self.num=7 and hence second print statement prints 7

22) Which of the following statements is not true about object-oriented programming?

A. One of the benefits of object-oriented programming is that it can hide complexity.

B. A class contains functions as well as the data that is used by those functions.

C. Constructor methods are required to initialize an object and destructor methods are required to destroy the object when no longer required.

D. A powerful feature of object-oriented programming is the ability to create a new class by extending an existing class

-> This is false, a constructor is optional can be used to set initial values for an object and python automatically destroys any object if its reference count changes to a zero without needing a destructor.

23) What is the other name of new shell?

(A) Baby shell (B) Junior shell **(C) Child shell** (D) Assistant shell

24) What was the first version of Linux?

(A) 1.0 **(B) 0.11** (C) 1.01 (D) 0.10

Next Alphabet

25) **Next Alphabet**

Problem Statement:

Mr. X has a string s consisting of lowercase English letters. He repeats the following operation on s exactly K times.

- Choose an arbitrary letter on s and change that letter to the next alphabet. Note that the next letter of z is a.

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For example, if you perform an operation for the second letter on aaz, aaz becomes abz. If you then perform an operation for the third letter on abz, abz becomes aba.

Mr. X wants to have the lexicographically smallest string after performing exactly K operations on s. Find the such string.

Input Format:

- First line contains integer t, denoting the number of test cases.
 - First line of each test case contains string s
 - Second line of each test case contains integer K.
-

Constraints :

- $1 \leq |s| \leq 10^5$
 - - All letters in s are lowercase English letters.
 - $1 \leq K \leq 10^9$
-

Output Format:

For each test case, Print the lexicographically smallest string after performing exactly K operations on s.

Sample Input:

1

xyz

4

Sample Output :

aya

Sample Explanation :

You can perform the following operations: xyz, yyz, zyz, ayz, aya.

Explanation :

When the problem asks for the lexicographically smallest sequence, the following greedy strategy typically works: focus on one element at a time in order from the beginning of the sequence, and each time make the current element as small as possible. This problem is no exception.

Suppose that we are focusing on a letter c in the string. Consider making this letter as small as possible. Assume that in order to change c into a the operation has to be performed at least t times. Compare t with the remaining number of operations, K . If $K \geq t$, then c should be changed into a by performing the operation t times. Otherwise ($K < t$), c should be left as it is. Repeat this procedure from the beginning of s to the end.

After the procedure is executed on all letters in s , the remaining number of operations, K , must be consumed. We can simply perform the operation K times on the last letter in the string. Note that programs that naively performs the operation K times will time out when $K = 109$. A simple solution would be to replace K with K modulo 26 before naively

performing the operation.

When implementing the solution in C++, the following techniques could be useful:

- A letter c is the $(c - 'a')$ -th letter of the alphabet (0-indexed).
- The k -th letter of the alphabet (0-indexed) is $(\text{char})('a' + k)$.

Code ->

```
#include <bits/stdc++.h>
```

```
using namespace std;
```

```
int main() {
```

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```
int t;

cin>>t;

while(t--){

    long long int k;

    string s;

    cin>>s;

    cin>>k;

    for(int i=0;i<s.size();i++){

        if(s[i]=='a'){

            continue;

        }

        int temp=int(s[i]);

        if(k>=(123-temp)){

            s[i]='a';

            k=k-(123-temp);

        }

    }

    int na=s.size();

    while(k--){

        s[na-1]++;

    }

    cout<<s<<endl;

}
```

}

26) YourPalPALindrome

Problem Statement:

Your teacher asked you to make palindromes using a certain amount of letters which he/she has mentioned. For doing so he has given a method in which you can convert all the instances of a certain character into another character.

Output the minimum number of times you have to use this method to make a palindrome.

Input Format:

- First line contains T i.e. number of test cases.
 - Second line contains N i.e. the number of distinct alphabets present in the word
 - Third line contains N-spaced integers denoting the number of occurrences of i-th character of the word.
-

Constraints:

- $1 \leq T \leq 1000$
 - $1 \leq N \leq 2 \cdot 10^5$
 - $1 \leq A_i \leq 10^9$
-

Output Format:

Single integer denoting the total number of times we use the given method.

code->

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```
#include <iostream>
```

```
using namespace std;
```

```
int main() {
```

```
    int t;
```

```
    cin>>t;
```

```
    while(t--){
```

```
        long long int n;
```

```
        cin>>n;
```

```
        long long int ar[n],c1=0,odd=0;
```

```
        for(int i=0;i<n;i++){
```

```
            cin>>ar[i];
```

```
            if(ar[i]%2!=0){
```

```
                odd++;
```

```
                if(ar[i]==1)
```

```
                    c1++;
```

```
            }
```

```
        }
```

```
        if(odd)
```

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```
{  
    if(odd>2)  
    {  
        if(c1){  
            odd--;  
        }  
        cout<<odd/2<<endl;  
        continue;  
    }  
    else if(odd==2)  
    {  
        cout<<odd/2<<endl;  
        continue;  
    }  
    else  
    {  
        cout<<"0\n";  
        continue;  
    }  
}  
  
cout<<"0\n";
```

```
}  
  
return 0;  
  
}
```

27) Optimal Subsequence

Problem Statement:

You are provided with an array A containing N integers. A subsequence of this array is optimal if all the elements of this subsequence are distinct.

Find the number of optimal non-empty subsequences of A.

Two subsequences are considered different if they differ in the indices chosen. For example, in the array [1,1] there are 3 different non-empty subsequences: [1](the first element), [1] (the second element) and [1, 1]. Out of these three subsequences, the first two are good and the third is not.

Input Format:

- First line contains integer t, number of test cases
- First line of each test case, contains an integer N, denoting number of elements in the array.
- Second line of each test case contains N space-separated integers A1,A2,...An

Constraints:

- $1 \leq T \leq 10^5$
 - $1 \leq N \leq 10^5$
 - $1 \leq A_i \leq 10^6$
 - The sum of N over all test cases does not exceed 10^6
 - Use appropriate techniques in case of integer overflow.
-

Output Format:

For each test case, print a single line containing one integer — the number of optimal subsequences

Code :

```
> #include<bits/stdc++.h>
using namespace std;
#define ll long long
void solve(){
    int n;
    cin >> n;
    map<int, int> freq;
    for(int i = 0; i < n; ++i){
        int a;
        cin >> a;
        ++freq[a];
    }
    int ans = 1;
    for(auto [u, v] : freq){
        ans *= v + 1;
    }
    --ans;
    cout << ans << '\n';
}
int main(){
    ios_base::sync_with_stdio(false);
    cin.tie(NULL);
    cout.tie(NULL);

    int t;
    cin >> t;
    while(t--){
        solve();
    }

    return 0;
}
```

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