MCQ

Question 1 | Max. score: 2.00

What is the output of the following C++ code:

Code

```
#include <iostream>
using namespace std;
int main() {
  int no=5;
  if (no % 2) {
    cout <<"I love hackerearth";
  }
  else {
    cout << "I love to code";
  }
  return 0;
}
```

- I love hackerearthI love to code
- I love to code
- I love hackerearth
- Runtime Error

Question 2 | Max. score: 4.00

What is the output of the following C++ code for inputs 8 and 16 respectively?

Code:

```
#include <stdio.h>
int main() {
 int n1, n2, i, res;
 scanf ( "%d %d", &n1, &n2);
 for( i = 1; i <= n1 && i <= n2; ++i)  {
   if (n1 % i ==0 && n2 % i == 0)
    res = i;
 }
 printf ("%d",res);
 return 0;
}
```

- 0
- 3
- 6
- 8

Question 3 — Max. score: 4.00

What is the output of the following C++ code:

```
#include <iostream>
#include <vector>
using namespace std;
int main()
{
    vector<int> val1(3, 1);
    vector<int> val2(1, 5);
    val2 = val1;
    val1 = vector<int>();
    cout << "Size of val1 " << int(val1.size()) << '\n';
    cout << "Size of val2 " << int(val2.size()) << '\n';
    return 0;
}
```

- Size of val1 3 Size of val2 5
- Size of val1 0 Size of val2 3
- Size of val1 3 Size of val2 1
- None of these

Question 4 — Max. score: 2.00

In C++, which of the following is equivalent to *ptr++?

- ptr++
- *ptr
- ++*ptr
- None of these

Question 5 ⓘ Max. score: 4.00

What is the output of the following C++ code?

Code

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

class MyHackClass
{
   private:
    int MyHackVar;

   public:

    MyHackClass() : MyHackVar(7)
    {
    }

    void operator ++()
    {
        MyHackVar = MyHackVar + MyHackVar * MyHackVar - MyHackVar;
    }

    void MyHackFunc()
    {
        cout << "Result: " << MyHackVar << endl;
    }
};

int main()
{
    MyHackClass myhackobj;

    ++myhackobj;

    myhackobj.MyHackFunc();
    return 0;
}
```

Output

1. `Result: 91`
2. `Result: 49`
3. `Result: 72`

- 1
- 2
- 3
- Compilation error

Code

```
#include <iostream>
#include <cstdlib>
#include <pthread.h>
using namespace std;
char* st = "Child thread";
void* hack_func(void *st){
  cout << "Created child thread: " << (char*)st;
 }
int main(){
  pthread_t t;
  pthread_create(&t, NULL, &hack_func, (void*)st);
  cout << "Created Main thread!" << endl;
  pthread_join(t, NULL);
  exit(EXIT_SUCCESS);
  return 0;
}
```

Options

1.

```
Created Main thread!
Created child thread: Child thread
```

2.

```
Created Main thread!
```

3.

```
Created child thread: Child thread
```

- 1
- 2
- 3
- Runtime Error

Code:

```
#include <iostream>
#include <string>
using namespace std;
int main() {
     int Var1 = 10;
        char Var2 = 'd';

                Var1 = Var1 + Var2;


        float Var3  = Var1 + 7.0;
        cout<<"Var1 = "<<Var1<<", Var3 ="<<Var3;

        return 0;
}
```

- Var1 = 110, Var3 =117
- Var1 = 10d, Var3 = 117.000000
- Var1 = 110, Var3 = 117.000000
- Var1 = 10d, Var3 = 117

Ben is working on an application using C++. While working on it, he wants to find out which of the following is not a Standard Library header.

- <algorithm>
- <regex>
- <iterators>
- <process>

Question 9

Max. score: 4.00

What is the output of the following C++ code:

```
#include <iostream>
using namespace std;
ostream& operator<<(ostream& i, int n)
{
    return i;
}
int main()
{
    cout << 5 << endl;
    cin.get();
    return 0;
}
```

- 5
- 6
- Compilation error
- Run-time error

Question 10 Max. score: 2.00

In C++, which of the following is an **integral** data type?

- void
- char
- float
- double

Reset Answer

Question 11 Max. score: 2.00

In C++, which of the following mechanisms is also called as the compile-time **polymorphism**?

- Late interpretation
- Late binding
- Early binding
- Overloading

Question 12 Max. score: 4.00

What is the output of the following C++ code:

Code

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

class hack {
public:
        void hack_1() { cout << "hack-1\n"; }
        virtual void hack_2() { cout << "hack-2\n"; }
        virtual void hack_3() { cout << "hack-3\n"; }
        virtual void hack_4() { cout << "hack-4\n"; }
};

class derived : public hack {
public:
```

```
public:
        void hack_1() { cout << "derived-1\n"; }
        void hack_2() { cout << "derived-2\n"; }
        void hack_4(int x) { cout << "derived-4\n"; }
};

int main()
{
        hack *p;
        derived obj1;
        p = &obj1;
        p->hack_1();
        p->hack_2();
        p->hack_3();
        p->hack_4();
        return 0;
}
```

Options:

1.

```
hack-1
derived-2
hack-3
hack-4
```

2.

```
hack-1
hack-2
hack-3
hack-4
```

3.

```
hack-1
derived-1
derived-2
derived-4
```

4.

```
hack-1
hack-2
hack-3
derived-4
```

1

2

3

4

Question 13

Max. score: 4.00

What is the output of the following C++ code:

Code:

```
#include <iostream>
using namespace std;
int operate(int a, int b)
{
    return (a * b);
}
float operate(float a, float b)
{
    return (a / b);
}
int main()
{
    int x = 5, y = 2;
    float n = 5.0, m = 2.0;
    cout << operate(x, y) << ' ';
    cout << operate(n, m);
    return 0;
}
```

10.0 5.0

5.0 2.5

10.0 5

10 2.5

Code

```
#include <iostream>
using namespace std;
int mult(int x, int y)
{
    int result;
    result = 0;
    while (y != 0) {
        result = result + x;
        y = y - 1;
    }
    return (result);
}
```

```
int main()
{
    int x = 9, y = 6;
    cout << mult(x, y);
    return (0);
}
```

- 45
- 54
- 63
- 9

Question 15 Max. score: 2.00

Ben is working on an application using C++. While working on it, he is exploring copy constructors. So now, he wants to find out when is the copy constructor called.

- An object of the class is returned by value
- A compiler generates a temporary object
- An object is constructed based on another object of the same class
- All of these

Programming Assessment

Problem 2: Debugging – Sum Game

You are given a code for the following problem statement in the function. However, the solution fails the test cases because there are bugs in the code. Your task is to find and fix all the bugs so that it passes all the test cases.

Alice and Bob each have N integers represented by arrays A and B, respectively. For a given integer value K, they want to minimize the product sum:
sum = A[0] * B[0] + A[1] * B[1] + ... + A[N-1] * B[N-1]

They are allowed to perform operations (possibly zero) on their respective arrays to reduce this sum so that it becomes less than or equal to K.

Operation Rule:
- In one operation, a player chooses an index i and replaces the element x with ⌊x / 2⌋ (floor division).
- The operation is repeated until the desired condition is met.

Your task is to determine who can achieve the required sum in fewer operations.

- Print "Alice" if Alice requires fewer operations.
- Print "Bob" if Bob requires fewer operations.
- Print "Tie" if both require the same number of operations.

Input Format

- The first line contains a single integer T, the number of test cases.
- For each test case:
  - The first line contains a single integer N (size of the arrays).
  - The second line contains N space-separated integers representing array A.
  - The third line contains N space-separated integers representing array B.
  - The fourth line contains a single integer K.

Output Format

• For each test case, print a single word: "Alice", "Bob", or "Tie".

Constraints

• 1 ≤ T ≤ 100
• 1 ≤ N ≤ 10^4
• 1 ≤ A[i], B[i] ≤ 10^6
• 1 ≤ K ≤ 10^12

Example

Input

1
2
3 4
10 1
15

Output

Alice

Explanation

Initial sum: 3*10 + 4*1 = 30 + 4 = 34

Alice's Turn:
Reduce A[0] = 3 → 1
Now: 1*10 + 4*1 = 10 + 4 = 14 ≤ K
Operations required: 1

Bob's Turn:
Reduce B[0] = 10 → 5
Reduce B[1] = 1 → 0
Now: 3*5 + 4*0 = 15 ≤ K
Operations required: 2

Hence, the answer is "Alice".

Problem 1: Debugging – Adding AP

You are given a code for the following problem statement in the function. However, the solution fails the test cases because there are bugs in the code. Your task is to find and fix all the bugs so that it passes all the test cases.

You are given an array A of N integer elements. You apply Q operations on the array, where each operation is defined as:
L R a d
In this operation, for all indices i from L to R (1-based), you add the ith term of an arithmetic progression to A[i]. That is, B[i] = a + (i - L) * d.

Task:
Determine the value of array A after applying all the Q operations. Since the values can be large, output each element modulo 10^9 + 7.

Note: 1-based indexing is followed for the operations.

Input Format

- The first line contains T, the number of test cases.
- For each test case:
  - The first line contains a single integer N.
  - The second line contains N space-separated integers (array A).
  - The third line contains a single integer Q.
  - The next Q lines each contain four integers: L R a d.

Output Format

- For each test case, print N space-separated integers representing the final values of array A modulo 10^9 + 7.

Constraints

- $1 \le T \le 100$
- $1 \le N \le 10^5$
- $1 \le Q \le 10^4$
- $1 \le L \le R \le N$
- $0 \le a, d \le 10^9$
- $0 \le A[i] \le 10^9$

Example

Input

```
1
4
5 4 2 8
2
```

1 2 1 3
1 4 4 1

Output

10 13 8 15

Explanation

Initial Array: A = [5, 4, 2, 8]
1st Operation (1, 2, 1, 3): Add B = [1, 4] → A = [6, 8, 2, 8]
2nd Operation (1, 4, 4, 1): Add B = [4, 5, 6, 7] → A = [10, 13, 8, 15]
Final Result: 10 13 8 15

Problem 3: Debugging – Count the Sheets

You are given a code for the following problem statement in the function. However, the solution fails the test cases because there are bugs in the code. Your task is to find and fix all the bugs so that it passes all the test cases.

You are given N papers along with their dimensions, including the height and width of the paper.

Paper B can cover another paper A if any one of the two conditions is satisfied:
• widthA < widthB and heightA < heightB
• heightA < widthB and widthA < heightB

Task

For each paper, determine the number of papers it can cover.

Example

Assumptions:

N = 3
height = [1, 2, 3]
width = [4, 5, 6]

Approach

Paper 1 has height = 1 and width = 4, it cannot cover any other paper.
Paper 2 has height = 2 and width = 5, it can cover paper 1.
Paper 3 has height = 3 and width = 6, it can cover paper 1 and paper 2.
Therefore, the answers for paper 1, paper 2, and paper 3 are 0, 1, and 2, respectively.

Input Format

• The first line contains a single integer T, which denotes the number of test cases.
• For each test case:
  - The first line contains the integer N.
  - The second line contains N space-separated integers representing the heights of the papers.
  - The third line contains N space-separated integers representing the widths of the papers.

Output Format

• For each test case, print N space-separated integers representing the answer for all the papers in a new line.

Sample Input

2
3

3 2 5
3 4 4
3
1 2 3
4 5 6

Sample Output

0 0 2
0 1 2

Explanation

Test Case 1:
N = 3, height = [3, 2, 5], width = [3, 4, 4]
Paper 1 cannot cover any other paper.
Paper 2 cannot cover any other paper.
Paper 3 can cover paper 1 and paper 2.
Output: 0 0 2

Test Case 2:
N = 3, height = [1, 2, 3], width = [4, 5, 6]
Paper 1 covers none, Paper 2 covers paper 1, Paper 3 covers paper 1 and 2.
Output: 0 1 2

Problem 4: Debugging – Bitwise Sum

You are given a code for the following problem statement in the function. However, the solution fails the test cases because there are bugs in the code. Your task is to find and fix all the bugs so that it passes all the test cases.

You are given an integer K.

A function F(x) is defined for all non-negative integers x as follows:

Let
F(x) = sum of all values (x | i) - (x & i)
for all i such that $0 \leq i \leq x$

Determine the number of non-negative integers x such that $F(x) \leq K$.

Example

Assumption: K = 6

Approach:

- F(0) = 0
- F(1) = (1|0 - 1&0) + (1|1 - 1&1) = 1 + 0 = 1
- F(2) = (2|0 - 2&0) + (2|2 - 2&2) = 2 + 0 = 2 → valid
  i = 1 gives (2|1 - 2&1) = 3 - 0 = 3 ≠ 1 → invalid
- F(3) = (3|0 - 3&0) + (3|1 - 3&1) + (3|2 - 3&2) + (3|3 - 3&3) = 3 + 2 + 1 + 0 = 6
- F(4) = 4
- Other values exceed K

So the valid x values are: 0, 1, 2, 3, 4
Answer: 5

Input Format

- The first line contains an integer T, the number of test cases.
- For each test case:
  - A single integer K.

Output Format

- For each test case, print an integer in a new line – the number of valid values of x such that F(x) ≤ K.

Constraints

- 1 ≤ T ≤ 100
- 0 ≤ K ≤ 10^5

Sample Input
1
6

Sample Output
5

Sample Explanation

For K = 6, the values of x that satisfy F(x) ≤ K are 0, 1, 2, 3, 4. So the answer is 5.

Problem 5: Debugging – Find Array

You are given a code for the following problem statement in the function. However, the solution fails the test cases because there are bugs in the code. Your task is to find and fix all the bugs so that it passes all the test cases.

You are given an array A consisting of N integer elements.

Task

Determine the value of another array B, which is defined as follows:

B[i] = A[1] * F(i,1) + A[2] * F(i,2) + ... + A[N] * F(i,N), where function F is defined as:
F(i, j) = min(i, N - j + 1)

Notes

- 1-based Indexing is followed.
- The value of array elements in B can be large, output it modulo 10^9 + 7.

Example

Assumptions

N = 3
A = [3, 1, 4]

Approach

The value of function F is calculated as follows:
F(1, 1) = min(1, 3 - 1 + 1) = 1 , F(1 , 2) = min(1, 3 - 2 + 1) = 1, F(1, 3) = min(1, 3 - 3 + 1) = 1.
F(2, 1) = F(1, 2) = 1, F(2, 2) = min(2, 3 - 2 + 1) = 2, F(2, 3) = min(2, 3 - 3 + 1) = 1.
F(3, 1) = F(1, 3) = 1, F(3, 2) = F(2, 3) = 1, F(3, 3) = min(3, 3 - 3 + 1) = 1.

B[1] = A[1] * F(1,1) + A[2] * F(1, 2) + A[3] * F(1, 3) = 3 * 1 + 1 * 1 + 4 * 1 = 8.
B[2] = A[1] * F(2,1) + A[2] * F(2, 2) + A[3] * F(2, 3) = 3 * 1 + 1 * 2 + 4 * 1 = 9.
B[3] = A[1] * F(3,1) + A[2] * F(3, 2) + A[3] * F(3, 3) = 3 * 1 + 1 * 1 + 4 * 1 = 8.

Hence, the required answer is [8, 9, 8].

Function description

Complete the findArray function provided in the editor. This function takes the following 2

parameters and returns an array denoting the elements of array B:

- N: Represents the number of elements in array A
- A: Represents the elements of the array A

Input format

Note: This is the input format that you must use to provide custom input (available above the Compile and Test button).

The first line contains a single integer T that denotes the number of test cases. T also denotes the number of times you have to run the findArray function on a different set of inputs.
For each test case:
- The first line contains an integer N.
- The second line contains N space-separated integers denoting the elements of array A.

Output format

For each test case, print N space-separated integers representing the elements of array B modulo 10^9 + 7 in a new line.

Constraints

- $1 \le T \le 100$
- $1 \le N \le 10^3$
- $0 \le A[i] \le 10^6$

Sample Input
1
2
10 2

Sample Output
12 12

Sample Explanation

For test case 1:
F(1, 1) = min(1, 2 - 1 + 1) = 1 , F(1 , 2) = min(1, 2 - 2 + 1) = 1
F(2, 1) = F(1, 2) = 1, F(2, 2) = min(2, 2 - 2 + 1) = 1

B[1] = 10 * 1 + 2 * 1 = 12

B[2] = 10 * 1 + 2 * 1 = 12
Hence, the required answer is [12, 12].