ADSA-2021 **Lab Assignment - 3 Duration: 3 Hrs (**Time:2PM to 5PM **)**

INSTRUCTIONS

1. ALL THREE PROBLEMS are COMPULSORY
2. Carefully read all assignment problems.
3. Write only a single main function. You can call the required functions from the main function. Print the list of elements wherever necessary.
4. Name the file as follows: **S2020xxxxx_A03.c**
5. DO NOT zip. Upload a single .c file directly to your submission in the common Google classroom.
6. Don't share or copy the codes. If malpractice is found, you will be awarded Zero.

QUESTION 1: **2-Points**

Given an array A of N integers, classify it as being Good, Bad or Average. It is called Good if it contains exactly X distinct integers, Bad if it contains less than X distinct integers and Average if it contains more than X distinct integers.

Input Format

- First line consists of a single integer T denoting the number of test cases.
- First line of each test case consists of two space separated integers denoting N and X.
- Second line of each test case consists of N space separated integers denoting the array elements.

Output Format

Print the required answer for each test case on a new line.

Constrains

$1 \le T \le 50$

$1 \le X, N \le 13000$

$1 \le A[i] \le 10^9$

Sample Input	Sample Output
4 4 1 1 4 2 5 4 2 4 2 1 5 4 3 5 2 4 1 4 4 1 2 4 5	Average Average Average Good

QUESTION 2: **2-Points**

Monk is standing at the door of his classroom. There are currently N students in the class, i'th students got A_i candies.
There are still M more students to come. At every instant, a student enters the class and wishes to be seated with a student who has exactly the same number of candies. For each student, Monk shouts YES if such a student is found, NO otherwise.

Input Format

- First line contains an integer T. T test cases follow.
- First line of each case contains two space-separated integers N and M.
- Second line contains N + M space-separated integers, the candies of the students

Output Format

For each test case, output M new line, Monk's answer to the M students.

Print "YES" (without the quotes) or "NO" (without the quotes) pertaining to the Monk's answer.

Constrains

$1 \le T \le 10$

$1 \le N, M \le 10^5$

$0 \le A_i \le 10^{12}$

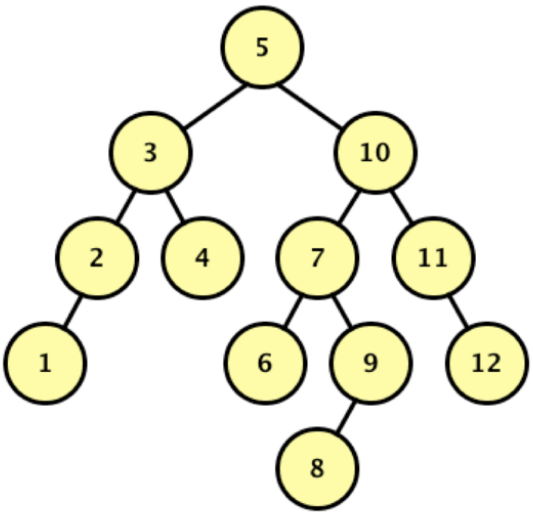
Sample Input	Sample Output
1 2 3 3 2 9 11 2	NO NO YES

Explanation

Initially students with 3 and 2 candies are in the class.
A student with 9 candies enters, No student with 9 candies in class. Hence, "NO"
A student with 11 candies enters, No student with 11 candies in class. Hence, "NO"
A student with 2 candies enters, Student with 2 candies found in class. Hence, "YES"

Question 3:

a) Construct the following BST. **2-Points**



b) Remove the root node from the above BST and replace it with an appropriate value from the node's **left** child. **[2-Points]**

c) Label each node in the resulting tree with its balance factor and find whether the tree is balanced or not.

[2-Points]