Very Friends

NOTICE: The test cases for this problem are not as hard as intended. If you've solved this problem, and think your solution is up for it, try VFRIEND2!

You are creating a new soical network for dogs. Wow. The dogs don't have many possibilities for interacting with your website, but they can bark how many friends they want. E.g. if a dog wants to have much 8 friends it will bark 8 times, and if it doesn't want any friends, it'll just stay quiet.

After spending a good year of your life collecting these barks, you are finally ready to assign a friend list for each dog. The only problem is: You are not sure whether it is actually possible. Thus before you proceed you would like to write a program, that given a list of **N** wishes $\mathbf{w_i}$, outputs **HAPPY** if it is possible to make a friend list for each dog **i** of length $\mathbf{w_i}$, or **SAD** if some dog will have to get more or fewer friends than it wished for.

Notice: Being friends is considered an irreflexive, symetric relation.

Update: If you manage to solve this problem much efficiently, have a look at VFRIEND2, which is a so harder version of this problem.

Input

The first line will contain a single integer **T** - the number of test cases to process.

Each following lines will start with an integer $\mathbf{0 \leq N \leq 10^5}$ followed by an ordered list of **N** wishes $\mathbf{0 \leq w_i \leq 10^5}$.

Output

Write the answer - **HAPPY** or **SAD** - for each test case on a separate line.

Example

Input:
3
3 0 1 1
5 0 1 2 3 4
6 1 1 2 2 3 3

Output:
HAPPY
SAD
HAPPY

Explanation

In the first case we can make dog 2 and 3 be friends.

In the second case no assignment that works, since dog 5 would have to be friends with everyone, but dog 1 doesn't want that.