

Programming Assignment #2

Not-So-Related Relative

Due: 11/21 23:59

Problem Description

After finishing the puzzle your mom gave you, you were finally allowed to have dinner. Starving and exhausted, you thought you'd have no difficulty swallowing a whole elephant.

You looked forward to enjoying your mom's signature dish: pork chops! The dinner would have gone well... had it not been for your younger cousin's sudden visit.

Out of some weird Asian-specific politeness and manners, your mom asked you to treat your cousin, and share some of (supposedly) your dinner, pork chops, with *zim*. "*Zie* is only a child! It does not hurt to share," your mom said.

After a day of hardworking, you really need those pork chops, so you did consider not giving *zim* any. However, your cousin would start crying with deafeningly loud noise if *zie* had less pork chops than you did. There was no escape. The best you could do was trying to share **exactly half** of the pork chops, so you could still have the remaining half.

Suppose there are n pork chops in your bowl, each i -th one with weight w_i , $w_i \in \mathbb{Z}$, $w_i > 0$.

You want to know if you can have **exactly half (of the total weight) of pork chops** by sharing the rest with your cousin. **Pork chops cannot be cut into smaller pieces.** That is, for each pork chop, either you, or your cousin, could have it.

I/O Format

Use standard I/O. (stdin, stdout)

Input

The first line contains one integer T , representing the number of test cases ($1 \leq T \leq 10$). T test cases follow.

For each test case, the first line contains one positive integer n , and the second line contains n integers w_i 's ($1 \leq i \leq n$), corresponding to the problem description.

The total weight of pork chops is promised to be at most K .

20% of the test cases are the examples shown below.

For 40% of the test cases, $n \leq 20$ and $K \leq 150$.

For 80% of the test cases, $n \leq 500$ and $K \leq 5000$.

For all of the test cases, $n \leq 1000$ and $K \leq 10^5$ (well, that's a lot of pork chops).

Output

For each test case, output `Yes\n` if you can share exactly half, or `QAQ\n` if impossible (`\n` is the newline character).

Time limit: 1000ms.

Examples

Input 1

```
1
4
3 5 1 7
```

Output 1

```
Yes
```

Input 2

```
1
4
2 10 4 2
```

Output 2

```
QAQ
```

Program Submission

1. Please use C/C++ and write your program in a **single source file**.
2. Your source file must be named as "`<Student_ID>_hw2.cpp`" and make sure that all characters in the filename are in **lower case**. For example, if your student ID is 106062000, the name of your program file should be `106062000_hw2.cpp`

3. Your program will be compiled in a GNU/Linux environment with:
`g++ -O2 -std=c++14 <Student_ID>_hw2.cpp`
4. The source file must be uploaded directly. Do not compress the file.
5. **0 point will be given to plagiarism. NEVER SHOW YOUR CODE** to others and you must write your code by yourself. If the codes are similar to other people and you cannot explain your code properly, you will be identified as plagiarism.

Report

1. Your report must contain the **flowchart or pseudo code** of your program. You have to describe how your approach works.
2. You have to analyze the **time complexity** of your program and prove it.
3. The report filename must be “**<Student_ID>_hw2.pdf**”. Please make sure that all characters of the filename are in lower case.

Grading Policy

You must submit both your source code and report. Follow the submission rules as mentioned or you will get deduction on your score.

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|--------------|-----|
| ● Test cases | 80% |
| ● Report | 20% |