UVa Online Judge

435 Block Voting

Different types of electoral systems exist. In a block voting system the members of a party do not vote individually as they like, but instead they must collectively accept or reject a proposal. Although a party with many votes clearly has more power than a party with few votes, the votes of a small party can nevertheless be crucial when they are needed to obtain a majority. Consider for example the following five-party system:

party	votes
A	7
B	4
C	2
D	6
E	6

Coalition {A,B} has $7 + 4 = 11$ votes, which is not a majority. When party C joins coalition {A,B}, however, {A,B,C} becomes a winning coalition with $7+4+2 = 13$ votes. So even though C is a small party, it can play an important role.

As a measure of a party's power in a block voting system, John F. Banzhaf III proposed to use the *power index*. The key idea is that a party's power is determined by the number of minority coalitions that it can join and turn into a (winning) majority coalition. Note that the empty coalition is also a minority coalition and that a coalition only forms a majority when it has more than half of the total number of votes. In the example just given, a majority coalition must have at least 13 votes.

In an ideal system, a party's power index is proportional to the number of members of that party.

Your task is to write a program that, given an input as shown above, computes for each party its power index.

Input

The first line contains a single integer which equals the number of test cases that follow. Each of the following lines contains one test case.

The first number on a line contains an integer P in $[1 \ldots 20]$ which equals the number of parties for that test case. This integer is followed by P positive integers, separated by spaces. Each of these integers represents the number of members of a party in the electoral system. The i-th number represents party number i. No electoral system has more than 1000 votes.

Output

For each test case, you must generate P lines of output, followed by one empty line. P is the number of parties for the test case in question. The i-th line (i in $[1 \ldots P]$) contains the sentence:

`party` i `has power index` I

where I is the power index of party i.

Sample Input

```
3
5 7 4 2 6 6
6 12 9 7 3 1 1
3 2 1 1
```

Sample Output

```
party 1 has power index 10
party 2 has power index 2
party 3 has power index 2
party 4 has power index 6
party 5 has power index 6

party 1 has power index 18
party 2 has power index 14
party 3 has power index 14
party 4 has power index 2
party 5 has power index 2
party 6 has power index 2

party 1 has power index 3
party 2 has power index 1
party 3 has power index 1
```