

## 5. Coalitions (koal)

3 sec / 15 sec

60 points

There are  $N$  members in the parliament, and each one of them is a representative of one of the  $K$  parties. Now the parties have to form a ruling colation.

For a coalition to be able to rule, it needs a majority in the parliament. On the other hand, the more parties in the coalition, the less stable it is because of possible differences of opinion. Thus, a coalition that would still have a majority in the parliament after excluding some of the parties in it is not very sensible.

More precisely, a group of parties can form a stable coalition under two conditions:

1. Together, the parties in the coalition have more than  $\frac{N}{2}$  members of the parliament.
2. If any of the parties were excluded from the coalition, the remaining ones would no longer have more than  $\frac{N}{2}$  members of the parliament.

Count the number of possible groups that could form stable coalitions.

**Input.** The first line of the file `koalsis.txt` contains  $N$ , the number of seats in the parliament, and  $K$ , the number of parties ( $1 \leq N \leq 10^{18}$ ,  $1 \leq K \leq 36$ ). The second line contains  $K$  integers  $M_1, M_2, \dots, M_K$  ( $1 \leq M_i \leq N$ ), where  $M_i$  is the number of members of the parliament in the  $i$ -th party. It is guaranteed that  $M_1 + M_2 + \dots + M_K = N$ .

**Output.** The only line of the file `koalval.txt` should contain a single integer: the number of possible stable coalitions.

**Example.**

<code>koalsis.txt</code>	<code>koalval.txt</code>
14 5	4
6 2 1 4 1	

Let's denote the parties as  $a, b, c, d, e$  from left to right. Then the possible stable coalitions are:

$$\{a, b\}, \quad \{a, d\}, \quad \{a, c, e\}, \quad \{b, c, d, e\}.$$

The group  $\{a, c\}$  can't be a coalition, because they do not have more than  $\frac{N}{2} = 7$  members of parliament in total. The group  $\{a, b, c\}$  can't be a stable coalition, because after excluding  $c$  it becomes  $\{a, b\}$ , which still has majority in the parliament.

**Example.**

<code>koalsis.txt</code>	<code>koalval.txt</code>
8 8	56
1 1 1 1 1 1 1 1	

Any group of 5 parties can form a stable coalition, so the answer is  $C_8^5 = 56$ .

**Example.**

<code>koalsis.txt</code>	<code>koalval.txt</code>
101 6	5
34 25 19 12 10 1	

**Grading.** In this task, tests are divided into groups. For each group, only those solutions get points that solve correctly all the tests in the group. In the test groups, the following additional conditions hold:

1. (5 points)  $K = 3$ ;
2. (5 points)  $K = N$ ;
3. (5 points)  $K \leq 20$ ;
4. (15 points)  $N \leq 10^6$ ;
5. (30 points) no additional restrictions.