SQRBR - Square Brackets

#dynamic-programming (/problems/tag/dynamic-programming)

You are given:

- a positive integer n,
- an integer k, 1<=k<=n,
- an increasing sequence of k integers $0 < s_1 < s_2 < \ldots < s_k <= 2n$.

What is the number of proper bracket expressions of length 2n with opening brackets appearing in positions s_1, s_2,...,s_k?

Illustration

Several proper bracket expressions:

```
[[]][[[]][]]
[[[]]]][][[]]
```

An improper bracket expression:

```
[[[]]]][]][[]]
```

There is exactly one proper expression of length 8 with opening brackets in positions 2, 5 and 7.

Task

Write a program which for each data set from a sequence of several data sets:

- reads integers n, k and an increasing sequence of k integers from input,
- computes the number of proper bracket expressions of length 2n with opening brackets appearing at positions s_1,s_2,...,s_k,
- writes the result to output.

Input

The first line of the input file contains one integer d, 1 <= d <= 10, which is the number of data sets. The data sets follow. Each data set occupies two lines of the input file. The first line contains two integers n and k separated by single space, 1 <= n <= 19, 1 <= k <= n. The second line contains an increasing sequence of k integers from the interval [1;2n] separated by single spaces.

Output

The i-th line of output should contain one integer - the number of proper bracket expressions of length 2n with opening brackets appearing at positions s_1, s_2,...,s_k.

Example

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Added by:	adrian (/users/adrian)
Date:	2004-06-22
Time limit:	3s
Source limit:	50000B
Memory limit:	1536MB
Cluster:	Cube (Intel G860) (/cluster
Languages:	All
Resource:	III Polish Collegiate Team Programming Contest (AMPPZ), 1998