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FS 2021

Algorithmen und Wahrscheinlichkeit
Programming Exercises

Exercise – *Winter Season*

As always, farmers are afraid of a harsh winter, because too many snowy days can ruin the crops for the whole year to come. More precisely, if out of n days it is snowing on at least k days, the season is considered to be a disaster.

You know that the probability of snow on the ith day is p_i, independently of other days. Compute the probability of a disaster season!

Input The first line of the input contains the number $t \leq 30$ of test cases. Each of the t test cases is described as follows.

- It starts with a line that contains two integers `n k`, separated by a space, where n denotes the number of days the winter will last ($1 \leq n \leq 10^3$), and the season will be a disaster if the number of snowy days is at least k ($0 \leq k \leq n$).
- The following line defines the probabilities of snow on each of the n days. It contains n real numbers $\texttt{p}_1 \ \ldots \ \texttt{p}_n$, separated by a space, denoting that the probability of a heavy snow on the ith day is p_i ($0 \leq p_i \leq 1$, for all $i \in \{1, \ldots, n\}$).

Output For each test case output one line containing one real number denoting the probability of the season to be a disaster. Your solution is going to be accepted if it has an absolute or relative error of at most 10^{-3}.

Points There are two test sets, worth 100 points in total.

1. For the first test set, worth 50 point, you may assume that $n \leq 30$.
2. For the second test set, worth 50 point, there are no additional assumptions.

Sample Input

```
3
4 2
0.5 0.5 0.5 0.5
2 1
0.25 0.75
3 2
0.1 0.2 0.3
```

Sample Output

```
0.6875
0.8125
0.098
```