
Algorithmen und Wahrscheinlichkeit

Programming Exercises 3

DEADLINE: 10 AM @ 29.03.2018

Exercise 1 – *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 i -th day is p_i , independently of other days. Compute the probability of a disaster season!

Input The first line of the input file 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, and the season will be a disaster if the number of snowy days is at least k . It holds $1 \leq n \leq 10^3$ and $0 \leq k \leq n$.
- The following line defines the probabilities of snow on each of the n days. It contains n real numbers $p_1 \dots p_n$, separated by a space, denoting that the probability of a heavy snow on the i -th day is p_i . It holds $0 \leq p_i \leq 1$.

Output For each test case output one line containing one real number denoting the probability of the season to be a disaster. You should round your result with the following piece of code:

```
DecimalFormat df = new DecimalFormat("0.0##");  
df.setRoundingMode(RoundingMode.HALF_DOWN);  
System.out.println(df.format(3.5)); // Replace 3.5 with your desired double
```

Points There are two test sets, worth 2 points in total.

1. For the first test set, worth 1 point, you may assume that $n \leq 30$.
2. For the second test set, worth 1 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

```
0.687  
0.812  
0.098
```