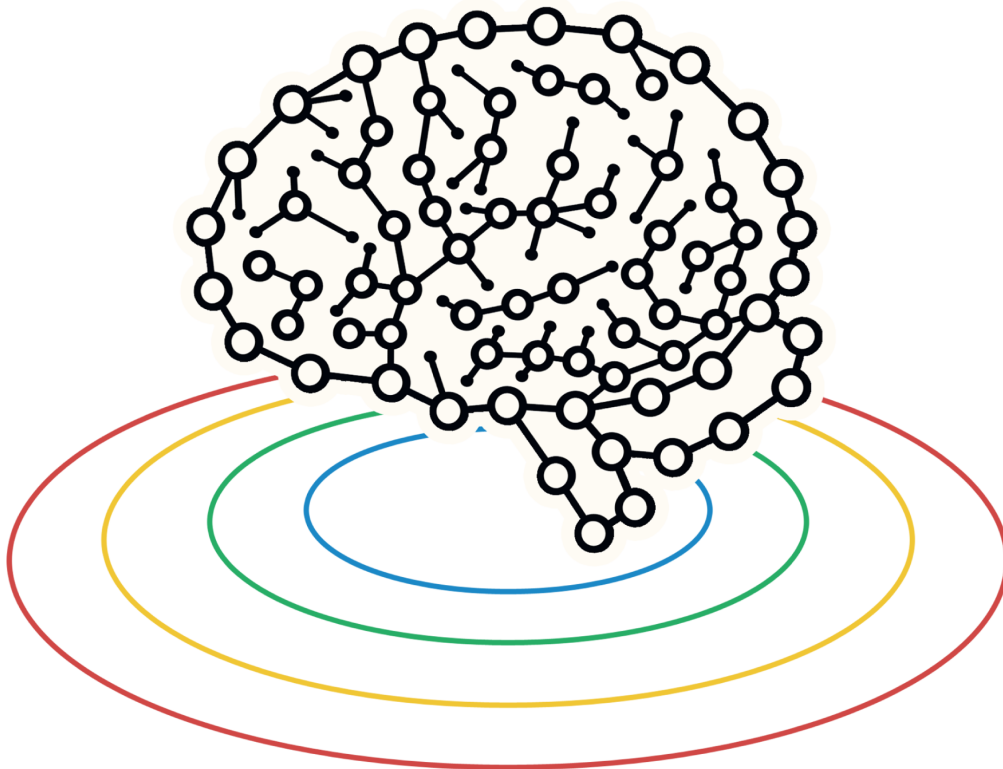Association for Computing Machinery
University of the Philippines Diliman Student Chapter, Inc.

# ALGOLYMPICS 2021
## UP ACM PROGRAMMING COMPETITION

# PRACTICE PROBLEMS

# ALGOLYMPICS 2021

## Sample Problem
### Guardians of the Lunatics
Time Limit: 2 seconds

You are in charge of assigning guards to a prison where the craziest criminals are sent. The $L$ cells form a single row and are numbered from $1$ to $L$. Cell $i$ houses exactly one lunatic whose *craziness level* is $C_i$.

Each lunatic should have one guard watching over him/her. Ideally, you should have one guard watching over each lunatic. However, due to budget constraints, you only have $G$ guards to assign. You have to assign which lunatics each guard should watch over in order to minimize the total risk of having someone escape.

Of course, you should assign each guard to a set of adjacent cells. The *risk level $R_i$* that the lunatic in cell $i$ can escape is given by the product of his/her craziness level $C_i$ and the number of lunatics the guard assigned to him/her is watching over. Getting the sum of the $R_i$'s from $i = 1$ to $i = L$ will give us the total amount of risk, $R$, that a lunatic might escape.

Given $L$ lunatics and $G$ guards, what is the minimum possible value of $R$?

### Input Format

The first line of input contains two space-separated positive integers: $L$ and $G$, the number of lunatics and the number of guards respectively.

The next $L$ lines describe the craziness level of each of the lunatics. The $i^{\text{th}}$ of these $L$ lines describe the craziness level of the lunatic in cell block $i$.

### Constraints

- $1 \le L \le 8000$
- $1 \le G \le 800$
- $1 \le C_i \le 10^9$

### Output Format

Output a line containing the minimum possible value of $R$.

| Sample Input | Sample Output |
|---|---|
| 6 3<br>11<br>11<br>11<br>24<br>26<br>100 | 299 |

**Explanation**

The first guard should be assigned to watch over the first three lunatics, each having a craziness level of $11$. The second guard should be assigned to watch over the next two lunatics, having craziness levels of $24$ and $26$. The third guard should be assigned to the craziest lunatic, the one having a craziness level of $100$.

The first three lunatics each have a risk level of $33$, the product of $11$ (their craziness level) and $3$ (the number of lunatics their guard is watching over). The next three lunatics have risk level of $48$, $52$ and $100$. Adding these up, the total risk level is $299$.

*This problem was adapted from NOI.PH (https://noi.ph/past-problems/)*