

Programming Assignment #3

Exam Preparation

Due: 23:59 Wednesday,

Problem Description

You are preparing for an important exam, and you have decided to manage your sleep schedule to get the most out of your time.

You have decided to measure your progress by an integer describing the remaining number of materials you need to finish reading. Initially, this number is measured as W units.

You have N days to prepare the exam. However, since you are a busy person, for each day you only have the choice of either not preparing the exam or sacrificing sleep.

For each day you study, you will reduce some constant number A from the number of remaining materials. (Note it is valid to have a negative number for the remaining materials at any moment, as it means you've done some work ahead of your schedule)

Everybody knows that bad sleep management leads to memory loss. Taking this into account, if you have not been sleeping for X days in a row (including this very day that you have decided to study), in the end of this day the number of remaining materials will be increased by $X * B$, where B is some constant factor.

Also, you are an anxious person. Specifically, if you have decided to sleep in the i 'th day, you would start to think that you need to do more work, and the number of remaining materials will be increased by $D[i]$.

Minimize the number of remaining materials in the end of the N 'th day.

I/O Format

Use standard I/O. (stdin, stdout)

Input

The first line contains four integers N, A, B, W , see the definitions in the problem description.

Then there is 1 line, with N integers each separated by a whitespace, the i 'th of which describes $D[i]$.

Your code will be evaluated by three independent levels of additional constraints:
(Time limit 1000 ms, i.e., your code must terminate gracefully before the time limit)

- 60%: $1 \leq N \leq 2000, 0 \leq A, B, W, D[i] \leq 10^5$
- 20%: $1 \leq N \leq 10^5, 0 \leq A, B, W, D[i] \leq 10^5$
- Bonus 20%: $1 \leq N \leq 10^5, 0 \leq A, B, W, D[i] \leq 10^8$

Output

Output the minimum number of remaining materials in the end of the N 'th day, followed by a newline. Do not print anything else, such as "Input/Output".

Examples

Input 1

```
4 1 0 4
10 10 10 10
```

Output 1

```
0
```

Input 2

```
2 5 2 0
0 6
```

Output 2

```
-4
```

Program Submission

1. Please use C/C++ and write your program in **a single source file**.
2. Your source file must be named as "**<Student_ID>_hw3.cpp**" and please make sure that all characters of the filename are in **lower case**. For example, if your student id is 106062000, the name of your program file should be 106062000_hw3.cpp.
3. Your program will be compiled in a GNU/Linux environment with:
`g++ -O2 -std=c++14 <Student_ID>_hw3.cpp`
4. **The source file must be uploaded directly, without compressing the file.**

5. You are not allowed to call system function (e.g., "system()"). Your work may not be graded if you have them in your code.
6. 0 points will be given to Plagiarism. NEVER SHOW YOUR CODE to others and you must write your code by yourself. If the codes are similar to other people and you can't explain your code properly, you will be identified as plagiarism. Note that two codes are considered similar if they have very similar structure, even if the variable names are modified.

Report

1. Your report must contain the flowchart or the pseudo code of your program. You have to describe how your approach works. The analysis of time complexity should be included as well.
2. The report filename must be "<Student_ID>_hw3.pdf" and please make sure that all characters of the filename are in lower case.

Grading Policy

You must submit both your source code and report. Remember the submission rules mentioned above, or you will be punished on your grade.

● Test cases	80%
● Report	20%
● Bonus	20%

If there are more than 10% of students pass the bonus test case. Only the first 10% of students to hand in their source code get the bonus.