Problem I. Interesting Game

Input file:	*standard input*
Output file:	*standard output*
Time limit:	2 seconds
Memory limit:	512 mebibytes

50th IMO 2009 *Combinatorics* **C5**

C5 NLD (Netherlands)

Five identical empty buckets of 2-liter capacity stand at the vertices of a regular pentagon. Cinderella and her wicked Stepmother go through a sequence of rounds: At the beginning of every round, the Stepmother takes one liter of water from the nearby river and distributes it arbitrarily over the five buckets. Then Cinderella chooses a pair of neighboring buckets, empties them into the river, and puts them back. Then the next round begins. The Stepmother's goal is to make one of these buckets overflow. Cinderella's goal is to prevent this. Can the wicked Stepmother enforce a bucket overflow?

Is it a notorious coincidence with this problem?

Cinderella and her wicked Stepmother are playing the game. Cinderella has n non-negative integers $a_1, a_2, \ldots, a_n$ at first. There are two parameters A and B for this game.

Cinderella and Stepmother take turns playing, starting with Cinderella. One each turn, Cinderella can replace the sequence $a_1, a_2, \ldots, a_n$ by a new **integer** sequence $a'_1, a'_2, \ldots, a'_n$ such that

- $a'_1 \geq a_1, \ldots, a'_n \geq a_n$
- $\sum\limits_{i=1}^{n} a'_i \leq \sum\limits_{i=1}^{n} a_i + A$

Then Stepmother can choose B indices $i_1, i_2, \ldots, i_B$, and set $a_{i_1}, a_{i_2}, \ldots, a_{i_B}$ to 0.

The game continues forever. Let M be the maximum value of $a_1, a_2, \ldots, a_n$ for all the time. Cinderella wants to maximize M, and Stepmother wants to minimize M.

Determine the value of M if both players play optimally.

Input

The first line contains an integer T ($1 \leq T \leq 10^5$) indicating the number of test cases. For each test case:

The first line contains three integers n, A, B ($1 \leq B \leq n \leq 10^5$, $0 \leq A \leq 10^{12}$).

The second line contains n integers $a_1, a_2, \ldots, a_n$ ($0 \leq a_i \leq 10^{12}$).

It is guaranteed that $\sum n \leq 5 \times 10^5$.

Output

For each test case, output a line containing one integer: the answer.

Example

standard input	standard output
4 3 5 1 1 2 3 5 5 1 0 2 1 0 3 5 100 5 1 2 3 4 5 8 3 1 5 1 2 2 0 2 5 1	11 14 105 9

Note

A possible game process for the first test case:

$\{1, 2, 3\} \to \{3, 4, 4\} \to \{3, 4, 0\} \to \{6, 6, 0\} \to \{6, 0, 0\} \to \{11, 0, 0\}$.