

Problem 8: Minimizing Wait Time

When scheduling the use of a resource (like a CPU), one measure of the schedule is the average length of time a client has to wait for the resource. That is, after a client indicates they want to use the resource, and for how long they want to use it, how long must they wait? This clearly depends on how many other clients want to use the resource, and when they are allowed to use it.

Assume that a particular resource is scheduled in integral units of time (for example, milliseconds), and that once a client is granted the use of the resource, they have complete (unshared) use of the resource for the length of time they requested. A schedule is just the order in which a group of clients are allowed to use the resource.

Suppose we know, in advance, the length of time each client wants to use the resource. Your task in this problem is to determine the minimum average time clients must wait before being allowed to use the resource.

For example, suppose we have three clients that want to use the resource. One (client A) wants it for 10 units of time. Another (client B) wants the resource for 13 units of time. Client C wants to use the resource for 6 units of time. If we let client A use the resource first, it waits 0 units of time. If we let B use it second (after A), then B waited a total of 10 units of time - exactly the length of time the resource was used by client A. Finally, client C uses the resource after waiting 10 units of time for A to finish and another 13 units of time for B to finish. So C had to wait 23 units of time. The average wait time is $(0 + 10 + 23) / 3$, or 11 units of time. As it turns out, the best schedule would require an average wait time of only $7 \frac{1}{3}$ units of time.

Input

The input will contain multiple cases. The number of cases is specified by the first integer in the input. The input for each case will consist of an unknown number of requests for the use of the resource. Each of these is represented by a positive integer separated from the others by whitespace. The last request in each case is followed by a negative number.

Output

For each case, display the case number (they start with 1 and increase sequentially), the number of requests for the resource, and the minimum average time clients had to wait for the resource. Display this number with three fractional digits. Your output should resemble that shown in the sample below.

Sample Input

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3 10 13 6 -1 54 95 10 57 -1 20
23 6 7 18 34 17 92 4 75 90 24 94
47 68 86 46 29 68 77 28 94 82 16
47 40 44 61 31 55 89 53 95 22 61 -1
```

Output for the Sample Input

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Case 1: 3 requests scheduled. Average wait: 7.333
Case 2: 4 requests scheduled. Average wait: 48.750
Case 3: 35 requests scheduled. Average wait: 555.714
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