▶ **Sample Case 1**

▶ **Sample Case 2**

Question - 2
Throttling Gateway

Non-critical requests for a transaction system are routed through a throttling gateway to ensure that the network is not choked by non-essential requests.

The gateway has the following limits:

- The number of transactions in any given second cannot exceed *3*.
- The number of transactions in any given *10* second period cannot exceed *20*. A ten-second period includes all requests arriving from any time *max(1, T-9)* to *T* (inclusive of both) for any valid time *T*.
- The number of transactions in any given minute cannot exceed *60*. Similar to above, *1* minute is from *max(1, T-59*) to *T*.

Any request that exceeds any of the above limits will be dropped by the gateway. Given the times at which different requests arrive sorted ascending, find how many requests will be dropped.

Note: Even if a request is dropped it is still considered for future calculations. Although, if a request is to be dropped due to multiple violations, it is still counted only once.

Example

n = 27

requestTime = [1, 1, 1, 1, 2, 2, 2, 3, 3, 3, 4, 4, 4, 5, 5, 5, 6, 6, 6, 7, 7, 7, 7, 11, 11, 11, 11]

- Request 1 - Not Dropped.
- Request 1 - Not Dropped.
- Request 1 - Not Dropped.
- Request 1 - Dropped. At most 3 requests are allowed in one second.
- No request will be dropped till 6 as all comes at an allowed rate of 3 requests per second and the 10-second clause is also not violated.
- Request 7 - Not Dropped. The total number of requests has reached 20 now.
- Request 7 - Dropped. At most 20 requests are allowed in ten seconds.
- Request 7 - Dropped. At most 20 requests are allowed in ten seconds.
- Request 7 - Dropped. At most 20 requests are allowed in ten seconds. Note that the 1-second limit is also violated here.
- Request 11 - Not Dropped. The 10-second window has now become 2 to 11. Hence the total number of requests in this window is 20 now.
- Request 11 - Dropped. At most 20 requests are allowed in ten seconds.
- Request 11 - Dropped. At most 20 requests are allowed in ten seconds.
- Request 11 - Dropped. At most 20 requests are allowed in ten seconds. Also, at most 3 requests are allowed per second.

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Hence, a total of 7 requests are dropped.

Function Description

Complete the *droppedRequests* function in the editor below.

droppedRequests has the following parameter(s):

int requestTime[n]: an ordered array of integers that represent the times of various requests

Returns

int: the total number of dropped requests

Constraints

- $1 \le n \le 10^6$
- $1 \le requestTime[i] \le 10^9$

▼ Input Format For Custom Testing

The first line contains an integer, *n*, the size of *requestTime*.

Each line *i* of the *n* subsequent lines (where $0 \le i < n$) contains an integer, *requestTime[i]*.

▼ Sample Case 0

Sample Input For Custom Testing

```
STDIN     Function
-----     --------
5    →    requestTime[] size n = 5
1    →    requestTime = [ 1, 1, 1, 1, 2 ]
1
1
1
2
```

Sample Output

```
1
```

Explanation

There are *4* requests that arrive at second *1*. This exceeds the per second limit so one packet is dropped. No other limits are exceeded.

▼ Sample Case 1

Sample Input For Custom Testing

```
STDIN     Function
-----     --------
21   →   requestTime[] size n = 21
1    →   requestTime = [1, 1, 1, 1, 2, 2, 2, 3,
3, 3, 4, 4, 4, 5, 5, 5, 6, 6, 6, 7, 7]
1
1
1
2
2
2
3
3
3
4
4
4
5
5
```

/

```
5
6
6
6
7
7
```

Sample Output

```
2
```

Explanation

In the first second, *4* requests arrive so one request is dropped. Within *10* seconds, all request times from second *1* to *7*, a total of *21* requests arrive. The last request is dropped. The total number of dropped requests is *2*.

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