

# Maximum Subarray Sum

We define the following:

- A *subarray* of an  $n$ -element array,  $A$ , is a contiguous subset of  $A$ 's elements in the inclusive range from some index  $i$  to some index  $j$  where  $0 \leq i \leq j < n$ .
- The *sum* of an array is the sum of its elements.

Given an  $n$ -element array of integers,  $A$ , and an integer,  $m$ , determine the maximum value of the sum of any of its subarrays modulo  $m$ . This means that you must find the sum of each subarray modulo  $m$ , then print the maximum result of this modulo operation for any of the  $\frac{n \cdot (n+1)}{2}$  possible subarrays.

## Input Format

The first line contains an integer,  $q$ , denoting the number of queries to perform. Each query is described over two lines:

1. The first line contains two space-separated integers describing the respective  $n$  (the array length) and  $m$  (the right operand for the modulo operations) values for the query.
2. The second line contains  $n$  space-separated integers describing the respective elements of array  $A = a_0, a_1, \dots, a_{n-1}$  for that query.

## Constraints

- $2 \leq n \leq 10^5$
- $1 \leq m \leq 10^{14}$
- $1 \leq a_i \leq 10^{18}$
- $2 \leq$  the sum of  $n$  over all test cases  $\leq 5 \times 10^5$

## Output Format

For each query, print the maximum value of *subarray sum % m* on a new line.

## Sample Input

```
1
5 7
3 3 9 9 5
```

## Sample Output

```
6
```

## Explanation

The subarrays of array  $A = [3, 3, 9, 9, 5]$  and their respective sums modulo  $m = 7$  are ranked in order of length and sum in the following list:

1.  $[9] \Rightarrow 9 \% 7 = 2$  and  $[9] \rightarrow 9 \% 7 = 2$

$$[3] \Rightarrow 3 \% 7 = 3 \text{ and } [3] \rightarrow 3 \% 7 = 3$$

$$[5] \Rightarrow 5 \% 7 = 5$$

$$2. \quad [9, 5] \Rightarrow 14 \% 7 = 0$$

$$[9, 9] \Rightarrow 18 \% 7 = 4$$

$$[3, 9] \Rightarrow 12 \% 7 = 5$$

$$[3, 3] \Rightarrow 6 \% 7 = 6$$

$$3. \quad [3, 9, 9] \Rightarrow 21 \% 7 = 0$$

$$[3, 3, 9] \Rightarrow 15 \% 7 = 1$$

$$[9, 9, 5] \Rightarrow 23 \% 7 = 2$$

$$4. \quad [3, 3, 9, 9] \Rightarrow 24 \% 7 = 3$$

$$[3, 9, 9, 5] \Rightarrow 26 \% 7 = 5$$

$$5. \quad [3, 3, 9, 9, 5] \Rightarrow 29 \% 7 = 1$$

As you can see, the maximum value for *subarray sum % 7* for any subarray is **6**, so we print **6** on a new line.