For all the problems notice the sample input/output carefully, your input/output format should follow that. No hard coded input would be acceptable. Also notice the required time complexity below each problem.

1. Given a binary string s(s_1s_2…..s_n) of size n and q queries. In each query you will be given two integers l,r and you've to answer how many 1's are there in the substring s_ls_{l+1}…...s_r .

Sample Input:	Output
10	
0101101001	
5	
1 3	1
2 7	4
1 10	5
2 5	3
1 7	4

Explanation:

For the 1st query the substring is : 010 , so the answer is 1.
For the 4th query the substring is : 1011 , so the answer is 3.

You need to solve the problem in O(n+q) complexity.

2. Given a string s(s_1s_2…….s_n) of length n consisting of lowercase english letters and q queries. In each query, you'll be given two integers l,r and a character c, you have to answer how many times c occur in the substring s_ls_{l+1}…...s_r.

Sample Input	Output
12	
bcbxyxxbcyab	
7	
3 8 x	3
2 8 b	2
2 4 c	1
1 12 b	4
1 12 x	3
2 10 d	0
5 5 y	1

Explanation:

For the 1st query, the substring is bxyxx , so x occurred 3 times.
For the 2nd query, the substring is cbxyxxb , so b occurred 2 times.

You need to solve the problem in O(n*alpha + q) complexity.
Where alpha = 26, as there are 26 characters from ‘a’ to ‘z’.

3. Given an integer array of size n, find the maximum subarray sum.

Sample Input	Output
4 2 -5 3 4	7
10 3 -4 2 1 -2 4 1 -5 -9 2	6

Explanation: 2 1 -2 4 1 gives us the best result.

3 -3 -2 -4	-2
2 4 6	10

You need to solve the problem in O(n) complexity.

4. You’ll be given an integer array of size n, for each index you have to answer the product of the whole array except this number. You can’t use the division operation.

Sample Input	Output
4 2 -3 1 4	-12 8 -24 -6

Explanation:

1st number of output is : (-3)*1*4 = -12
2nd number of output is : 2*1*4 = 8
3rd number of output is : 2*(-3)*4 = -24

4th number of output is : 2*(-3)*1 = -6

5
2 0 1 -2 9 0 -36 0 0 0

You need to solve the problem in O(n) complexity.

5. You'll be given an integer array a($a_1a_2….a_n$) of size n and q queries. In each query, you'll be given 3 integers l,r,x, which means you'll have to add x to each number in the range l to r. After all the queries you've to print the final array.

Sample Input	Output
7 2 1 0 3 -2 0 5 3 2 3 -2 3 5 4 1 6 10	12 9 12 17 12 10 5

Explanation:
After 1st query the array becomes, 2 -1 -2 3 -2 0 5
After 2nd query the array becomes, 2 -1 2 7 2 0 5
After 3rd query the array becomes, 12 9 12 17 12 10 5

You've to solve the problem in O(n+q) complexity.

6. You'll be given an 2D array/matrix of size n*m and q queries. In each query, you'll be given 4 integers, x_1,y_1,x_2,y_2. For each query, you've to answer the sum of all cells (x,y) such that $x_1 <= x <= x_2$ and $y_1 <= y <= y_2$.

Sample Input	Sample Output
4 5 2 3 4 2 0 1 2 23 0 1 -19 -4 0 1 13 2 -3 12 -1 2	

3

2 3 3 4	24
2 2 4 5	46
1 1 3 3	12

Explanation:
The sub-rectangle for 1st query is,

```
23 0
0  1
```

The sub-rectangle for 2nd query is,

```
 2  23 0  1
-4   0  1 13
-3 12 -1  2
```

The sub-rectangle for the 3rd query is,

```
 2  3   4
 1  2  23
-19 -4  0
```

You need to solve the problem in O(n*m + q) complexity.