

- 1.1. **For each task from this block, state for which set of values and which associative operation you need to build a tree of segments. The structure of the tree itself and the algorithm for performing operations cannot be changed.** There is an array  $a$  of  $n$  integers and two operations: assign a value:  $a_i = x$ , and one of the following:
- (1.1.1) find the minimum on the interval from  $l$  to  $r$ , and the number of elements equal to this minimum
  - (1.1.2) find the minimum on the segment from  $l$  to  $r$ , and the index of the leftmost element equal to this minimum
  - (1.1.3) find the value of the sum  $a_l - a_{l+1} + a_{l+2} - a_{l+3} + \dots \pm a_{r-1}$
  - (1.1.4) find the value of the sum  $a_l + 2a_{l+1} + 3a_{l+2} + \dots + (r-l)a_{r-1}$
  - (1.1.5) find on a given segment  $[l, r)$  a subsegment  $[l_1, r_1)$  ( $l \leq l_1 \leq r_1 \leq r$ ), the sum on which is maximum (it is enough to find this sum, but you can also also find the segment)
- 1.2. **In tasks from this block, you need to add a new operation to the segment tree.** There is an array  $a$  of  $n$  integers and two operations: assign a value:  $a_i = x$ , and one of the following:
- (1.2.1) find the minimum  $i$  for which  $a_i \geq k$
  - (1.2.2) find all  $i$  for which  $a_i \geq k$  in time  $O(x \log n)$ , where  $x$  is the size of the output
  - (1.2.3) find the minimum  $i$  on the segment from  $l$  to  $r$ , for which  $a_i \geq k$
- 1.3. There is a parking for  $n$  spaces. Each space can be occupied or free. Operations need to be processed: mark space as occupied/free, and one of the following:
- (1.3.1) find the number of free spaces on the segment from  $l$  to  $r$
  - (1.3.2) find  $k$ -th free space
  - (1.3.3) find free space closest to  $i$
- 1.4. There is a string of  $n$  brackets. You need to process requests: 1) change the  $i$ -th bracket, 2):
- (1.4.1) check if the substring from  $l$  to  $r$  is a valid brackets sequence
  - (1.4.2) find the largest prefix of a substring from  $l$  to  $r$  that is a valid sequence