

Live Leaderboard

CITS3001 Advanced Algorithms — Time limit: 3s

The UWA fun run uses staggered starts, so runners reach the finish line in no particular order of their *chip time* (net running time). The big screen at the finish must always show the current k -th fastest chip time, updated the moment each runner finishes.

Re-sorting everything after every finisher is far too slow. Recall heapselect from lectures: a heap supports insertion and removal of its top element in $O(\lg N)$ — and the screen never needs more than the k smallest times seen so far.

Input

The first line contains two integers n and k ($1 \leq k \leq n \leq 3 \cdot 10^5$), the number of runners and the rank shown on the screen. The second line contains n integers $t_1, \dots, t_n$ ($1 \leq t_i \leq 10^9$), the chip times in finishing order. Times may repeat.

Output

Output n lines. Line i contains the k -th smallest value among $t_1, \dots, t_i$, or -1 if $i < k$.

Sample Input 1

```
5 3
100 90 120 110 80
```

Sample Output 1

```
-1
-1
120
110
100
```

Sample Input 2

```
3 1
5 7 3
```

Sample Output 2

```
5
5
3
```