Yet Another Coffee

Input file:	standard input
Output file:	standard output
Time limit:	2 seconds
Memory limit:	256 megabytes

The girls of SYSU like drinking tea. But one day, they wanted a change and decided to try coffee in the next n days.

Now Zayin, who always provides food and drinks for SYSU, will go to the shop to buy some coffee. She learns that the price of day i is a_i. Meanwhile, she has m coupons - the i coupon can be used before day r_i (inclusively) and can reduce the price of coffee on that day by w_i.

Notice that each coupon can be used only once and Zayin can use more than one coupon per day. The price can be a negative number after using the coupons.

Since the girls of SYSU still need to drink tea, Zayin decided to choose some days to buy coffee. Now she wants to know the minimum money she will spend (or the maximum money she can get) if she chooses exactly k $(1 \leq k \leq n)$ days to buy coffee.

Input

The first line of the input contains a single integer t $(1 \leq t \leq 10)$ — the number of test cases. The description of the test cases follows.

The first line contains two integers n, m $(1 \leq n, m \leq 2 \times 10^5)$ - the number of days and the number of coupons.

The second line contains n integers $a_1, a_2, \cdots, a_n$ $(1 \leq a_i \leq 10^9)$ - a_i denotes the price of coffee on day i.

Next m lines, each line contains two integers r_i, w_i $(1 \leq r_i \leq n, \ 1 \leq w_i \leq 10^9)$, denoting that the i th coupon can be used before day r_i and can reduce the price by w_i.

Output

For each testcase, output n integers - the i th integer represents the minimum money Zayin will spend to buy coffee if she chooses exactly i days to buy coffee.

Notice that the answer can be a negative integer.

Example

standard input	standard output
2	-2 0 3 7 12
5 2	-21 -18 -15 -11 -5 3 13
1 2 3 4 5	
3 1	
4 2	
7 3	
4 3 1 10 3 8 6	
4 9	
3 8	
4 5	