

### Exercise – Astérix and the Tour of Gaul

After a short period of peace and quiet time in the village of the indomitable Gauls, inspector general Overanxius arrived in the Roman camp of Compendium. He was on a mission from Julius Caesar to lead an attack against the Gauls. Of course, the mission was a spectacular failure. To avoid a complete defeat, Overanxius gave orders to build a palisade around the village to prevent the villagers from spreading their dangerous ideas through Gaul.

Astérix and Obélix decide to escape from the entrapment and go on a tour of Gaul with the goal of sharing and spreading as many of the culinary traditions as possible around the country. To this end, they plan to buy typical dishes and drinks along the way and transport those culinary items for a few days to bring them to new cities and regions.

Astérix has mapped out a route with  $n$  stops. The route starts at stop  $s_0$ , continues through  $s_1, s_2$ , and so on, ending at stop  $s_{n-1}$ . Obélix has a large bag to transport the food. However, there are limitations on how many food items they can transport without attracting too much attention and ending up getting caught by the Romans. Thus for every  $i \in \{0, \dots, n-2\}$ , they decide on a maximum number  $c_i$  of food items that can be transported between stops  $s_i$  and  $s_{i+1}$ .

To be fully prepared for the trip, Astérix has also written down a long list of all the food items and cities where they could potentially buy and distribute them: Ham from Lutetia would be well received in Lugdunum, Champagne from Durocortorum would delight the people in Aginum, the salad from Nicae would enrich the menus in Massilia, and so on. Some food items are of larger cultural significance than other food items. Therefore, every food item has an assigned *significance*.

Your task is to come up with a transportation plan by selecting a subset of the food items to be transported. Astérix and Obélix can transport at most one item of each food item on their list. The goal is to maximize the sum of significances of the transported food items, while respecting the specified limits on the maximum number of food items in their bag for each leg of the trip. (At a stop, food items brought there are unloaded from the bag before any new items are loaded.)

**Input** The first line of the input contains the number  $t \leq 30$  of test cases. Each of the  $t$  test cases is described as follows:

- It starts with a line that contains two integers  $n, m$ , separated by a space. They denote
  - $n$ , the number of stops along the tour  $s_0, s_1, \dots, s_{n-1}$  ( $2 \leq n \leq 3 \cdot 10^2$ );
  - $m$ , the number of food items on Astérix's list ( $1 \leq m \leq 10^5$ ).
- The second line contains  $n-1$  integers  $c_0 \dots c_{n-2}$ , separated by a space, where  $c_i$  denotes the maximum number of food items that can be in the bag between stop  $s_i$  and  $s_{i+1}$  ( $0 \leq c_i \leq 10^2$ ).

- The following  $m$  lines describe the food items. Each food item is described by three integers  $a$   $b$   $d$ , separated by a space, and such that  $0 \leq a < b \leq n - 1$  and  $1 \leq d \leq 2^7$ . This means that this food item would need to be bought at stop  $s_a$  and brought to stop  $s_b$  and that this item has a significance of  $d$ .

**Output** For each test case output a line with one integer  $x$  that is the maximum *achievable significance*, defined as follows. A significance  $x$  is *achievable*, if there is a set of food items whose significances sum up to  $x$  and such that all the food items in the set can be transported between their corresponding stops without transporting more than  $c_i$  food items between stop  $s_i$  and stop  $s_{i+1}$ .

**Points** There are six groups of test sets, worth 100 points in total.

1. For the first group of test sets, worth 20 points, you may assume that all  $c_i$  values are the same and that there are no more than  $3 \cdot 10^2$  food items ( $m \leq 3 \cdot 10^2$ ).
2. For the second group of test sets, worth 20 points, you may assume that all  $c_i$  values are the same and that all food items are of same unit significance ( $d = 1$ ).
3. For the third group of test sets, worth 10 points, you may assume that all  $c_i$  values are the same.
4. For the fourth group of test sets, worth 20 points, you may assume that there are no more than 50 stops along the tour and no more than  $10^4$  food items ( $n \leq 50$ ,  $m \leq 10^4$ ).
5. For the fifth group of test sets, worth 10 points, there are no additional assumptions.
6. For the sixth group of test sets, which is hidden and worth 20 points, there are no additional assumptions.

Corresponding sample test sets are contained in `testi.in/out`, for  $i \in \{1, 2, 3, 4, 5\}$ .

#### Sample Input

```
3
6 4
2 2 2 2 2
0 3 1
1 5 1
3 4 1
0 3 1
6 4
2 2 2 2 2
0 3 32
1 5 40
3 4 16
0 3 38
6 4
2 2 2 1 0
0 3 32
1 5 40
3 4 16
0 3 38
```

#### Sample Output

```
3
94
86
```