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Exercise – *Attack on King's Landing*

"Drogon! Dracarys!"

Daenerys Targaryen
A Song of Ice and Fire
by George R. R. Martin

A queen of house Targaryen has come to conquer the city of *King's Landing* with her dragon. Already the dragon has started to set the city on fire. You are in charge of barricading the roads so that the people in the city can find shelter.

You are given a map of King's Landing. There are many roads, each of which connects two distinct *intersections*, the *ends* of the road. At every intersection there is an outbreak of fires. By building a *barricade* between an intersection and a road that ends at this intersection, the fire can be prevented from spreading into the road. In order to make a road *safe*, both of its ends have to be sealed off by a barricade from the corresponding intersections.

You command a brigade of troops, which are stationed at *barracks* located at different intersections. From every barracks you can send as many troops as necessary to build barricades. However, due to all the smoke and ash in the air your troops can only travel a short distance. So you can only build at intersections that are within this distance.

An intersection e is *within distance* d of an intersection f if there exists an integer $k \geqslant 0$ and a sequence of $k+1$ intersections $i_0, \ldots, i_k$ and roads $r_0, \ldots, r_{k-1}$ so that $i_0 = e$, $i_k = f$, road r_j ends at intersections i_j and i_{j+1} for $j \in \{0, \ldots, k-1\}$, and so that $\sum_{j=0}^{k-1} |r_j| \leqslant d$, where $|r_j|$ denotes the *length* of road r_j.

Also, space is limited and so only a small number of barricades can be built at each intersection. There are two different types of intersections: regular intersections and plazas. At a *regular intersection*, at most one road that ends there can be sealed off by a barricade. At a *plaza*, no more than two roads that end there can be sealed off by a barricade. There is no road for which both ends are plazas.

Your task is to devise a plan to make as many roads as possible safe.

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

- It starts with a line that contains five integers `n m b p d`, separated by a space. They denote
  - n, the number of intersections in King's Landing ($1 \leqslant n \leqslant 10^3$);
  - m, the number of roads in the city ($1 \leqslant m \leqslant 5 \cdot 10^4$);
  - b, the number of barracks in the city ($1 \leqslant b \leqslant 10^3$);
  - p, the number of plazas ($0 \leqslant p \leqslant 10^3$);

  - d, the distance that your troops can travel to build barricades ($1 \leqslant d < 2^{31}$).
- The second line contains b integers $a_0 \ \ldots \ a_{b-1}$, separated by a space, where a_i denotes the intersection where the i-th barracks is located ($0 \leqslant a_i < n$).
- If $p > 0$, then there is a third line that contains p integers $q_0 \ \ldots \ q_{p-1}$, separated by a space, where q_i denotes the intersection where the i-th plaza is located ($0 \leqslant q_i < n$). You may assume that these intersections are pairwise distinct.
- The following m lines describe the roads. Each line contains three integers x y l, separated by a space, where x and y denote the two ends of the road ($0 \leqslant x, y < n$) and ℓ denotes its length ($1 \leqslant \ell < 2^{20}$).

Output For each test case output a single line with a single integer that denotes the maximum number of safe roads achievable.

Points There are four groups of test sets, the first and third are worth 15 points each, the second and fourth are worth 25 points each. For each group there is also a corresponding hidden test set that is worth 5 points. So, there are $2 \cdot 15 + 2 \cdot 25 + 4 \cdot 5 = 100$ points in total.

1. For the first group of test sets you may assume that d is large enough so that every intersection can be reached and there are no plazas in the city ($p = 0$).
2. For the second group of test sets you may assume that there is only one barracks ($b = 1$) and there are no plazas in the city ($p = 0$).
3. For the third group of test sets you may assume that there are no plazas in the city ($p = 0$).
4. For the fourth group of test sets there are no additional assumptions.

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

Sample Input

```
3
2 1 1 0 10
0
0 1 5
5 5 2 1 5
0 1
3
0 1 5
1 2 5
2 3 5
3 4 5
4 0 5
5 5 1 1 10
0
3
0 1 5
1 2 5
2 3 5
3 4 5
4 0 5
```

Sample Output

```
1
2
3
```