Choosing Recipes

2017/2018 // UWr // MIA | Problem code: **CHOR** | Limits: **1 s**, **32 MB**

Ada loves to cook for her friends. Her pantry has room for P different ingredients (each labelled from 0 to P-1). At the moment, she only has M of the P ingredients on hand. Because Ada is a programmer, she represents her cookbook as a matrix M where a cell $M_{i,j}$ = 0 or 1 describes if a recipe number i needs an ingredient number j.

Ada wants to prepare N different dishes. If she doesn't have a certain ingredient in her pantry, she must purchase it; however, once she has an ingredient, she can use it in all recipes. Ada keeps a record of all ingredient costs in an array C where C_i is the cost of purchasing pantry ingredient number j.

Find the minimum cost for Ada to cook N different recipes and print it on a new line.

Input

The first line contains an integer Q (1≤Q≤20) – the number of queries. The subsequent lines describe each query in the following format: the first line of the query contains R (1≤R≤30) - the number of recipes, P (1≤P≤13) - the number of different ingredients, N (1≤N≤min(10,R)) - the number of dishes to prepare, and M (1≤M≤P) - the number of ingredients Ada has in her pantry.

The next line contains M integers describing ingredients present in Ada's pantry. The third line contains P integers describing cost array C ($1 \le C_i \le 10^4$). At the end, there is a binary matrix M of size R x P describing the necessity of ingredients in each recipe.

Output

For each query, print an integer on a new line denoting the minimum cost to prepare N dishes.

Example

Input:

```
1
4 5 2 2
3 4
1 3 2 4 8
0 0 1 0 0
1 1 1 1 1
1 0 0 0 1
1 1 0 1 1
```

Output:

```
3
```