Can you fill an $(a * b * c)$ cuboid with exactly n cubes? The cubes may touch, but cannot overlap and each cell inside the $(a * b * c)$ cuboid should be covered by exactly one cube. You may use cubes of different dimensions and for each positive integer p, you can use as many $(p * p * p)$ cubes as you like. For example, a $(2 * 2 * 3)$ cuboid can be filled with **five** cubes: **four** $(1 * 1 * 1)$ cubes and **one** $(2 * 2 * 2)$ cube. It can also be filled with **twelve** $(1 * 1 * 1)$ cubes.

To make this problem slightly more difficult, m of the cells in the cuboid are already filled and cannot be filled by another cube. Your job is to find out the possible values of n such that the remaining cells inside the cuboid, can be filled by exactly n cubes.

Input

There will be at most 300 test cases. Each test case begins with four integers a, b, c, m ($2 \leq a, b, c \leq 20$, $a * b * c \leq 125$, $0 \leq m < a * b * c$).

Each of the next m lines contains three integers x, y, z ($1 \leq x \leq a$, $1 \leq y \leq b$, $1 \leq z \leq c$), that means the cell (x, y, z) is already filled.

No cell will be mentioned twice. There will be at least one non-filled cell.

The input is terminated by a line containing four zeroes.

Output

For each test case, print the case number and the list of possible answers in increasing order. There is a single space before each number in the output. Look at the output for sample input for details.

Sample Input

```
2 2 3 0
2 2 3 2
1 1 1
2 2 3
0 0 0 0
```

Sample Output

```
Case 1: 5 12
Case 2: 10
```