Breaking Cake

Problem ID: breakingcake

The Hunter Exam has begun!

The first round of the Hunter Exam is a real-life problem solving test: Each candidate is given a rectangular parallelepiped cake of size $a \times b \times c$, which can be divided into unit cubes of size $1 \times 1 \times 1$.

Inside the cake, there are m unit cubes containing chocolate chips. The i-th cube is located at position (x_i, y_i, z_i).

The candidates must divide their given cake into exactly m rectangular parallelepiped parts, satisfying all the following conditions:

- For every two parts, their common space's volume must be zero.
- Each part must contain exactly one chocolate chip.
- The coordinates of the corners of all m parts must be integers.
- To prevent wasted food, candidates cannot throw away any part of the cake.

Can you divide the cake satisfying all the constraints and pass the first round of the Hunter Exam?

Input

The input contains multiple test cases. Each test case is described as below:

- The first line contains exactly 4 positive integers a, b, c and m. $(1 \leq a, b, c \leq 10^6, 1 \leq m \leq 10^3)$.
- In the next m lines, the i-th line contains exactly 3 positive integers x_i, y_i and z_i — the coordinates of the i-th chocolate chip. No two chips are in the same position. $(1 \leq x_i \leq a, 1 \leq y_i \leq b, 1 \leq z_i \leq c)$.

Sum of m over all test cases in one input file is at most 5×10^4.

The last line of the input contains a single number -1.

Output

For each test case:

- If it is impossible to divide the cake satisfying the above constraints, print exactly one line containing 'NO' .
- Otherwise, output one line containing 'YES', followed by m lines. The $i+1$-th line $(1 \leq i \leq m)$ contains exactly 6 integers, x_i, y_i, z_i, u_i, v_i and w_i representing the i-th part $(1 \leq x_i \leq u_i \leq a, 1 \leq y_i \leq v_i \leq b, 1 \leq z_i \leq w_i \leq c)$. (x_i, y_i, z_i) and (u_i, v_i, w_i) are the coordinates of two opposite unit cubes of the i-th part. The i-th part must contain the i-th chocolate chip.

Sample Input 1	**Sample Output 1**
5 5 5 2 1 1 1 5 5 5 5 5 5 1 3 3 3 -1	YES 1 1 1 5 5 1 1 1 2 5 5 5 YES 1 1 1 5 5 5