# 6415   Solar Powered Ants

In Blockland all houses have a rectangular base, vertical walls and a flat roof. Houses, and of course gardens, are all axis-aligned. In addition, local council regulations require that the height of a house be a fixed multiple of the height of the council one-storey building. Blockland is located on the equator of a planet on which the sun always goes from east to west, passing directly overhead at midday. Since there is no seasonal variation, Blocklanders measure time during the day by the length of shadows cast by a one-storey house. They call it shadow time, abbreviated as ST. Negative numbers denote shadows to the west (during the morning) and positive numbers denote shadows to the east (during the afternoon). Midday is 0 ST (i.e. zero shadow time).

Once a year, Blockland is invaded from all sides by an army of ants that devour any garden produce they can reach. The ants derive their energy directly from the sun and stop dead if any part of their solar absorbing body is not in direct sunlight. When the arrival hour of the ants is known, Blocklanders need to identify the status of their garden areas as safe or vulnerable to attack. Gardens whose entire areas are not reachable by the ants, due to presence of buildings and/or shadows, are safe and in no need of further protection.

At 2 ST, G1 is sunlit and exposed to attack from the top and the left. G2 is entirely in shadow from building B1 (because that building has a height of 2 and hence shadows of length 4) and therefore safe. G3 is partially sunlit but is protected by buildings B1, B2 and B3 and the shadows of buildings B4 and B5.
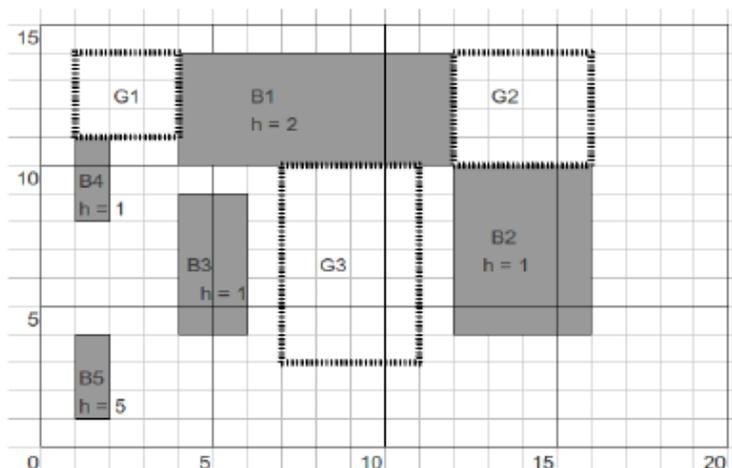
Your task is to write a program for Blocklanders that identifies the status of the garden regions.

Input

The input consists of a number of test cases. The description for each test case starts with three integers, b, g, and t, separated by single spaces on a line by themselves. b, g, and t are the number of buildings, the number of gardens and the shadow time of the ants invasion, respectively. $0 \leq b, g \leq 3000$, and $-1,000,000 \leq t \leq 1,000,000$.

Each of the following b lines contain 5 integers, x, y, w, b, h, separated by single spaces. x and y represent the coordinates of the bottom left corner of a building, w and b represent the x-span and y-span of the building, and h represents the height of the building in storeys. Buildings do not overlap other buildings. $0 \leq x, y \leq 1,000,000$, and $1 \leq w, b, h \leq 1,000,000$.

Each of the following g lines contain 4 integers, x, y, w, b, separated by single spaces. x and y represent the coordinates of the bottom left corner of a garden, w and b represent the x-span and y-span of the garden. Gardens do not overlap buildings or other gardens. $0 \leq x, y \leq 1,000,000$ and $1 \leq w, b \leq 1,000,000$.

Three zeros, separated by single spaces, on a line by themselves indicate the end of data and should not be processed.

Output

For each test case, the output starts with a line that begins with the word 'Test' followed by a space and then an integer n. n is the number of the test case starting with the value 1.

Each of the following g lines begins with an integer, which is a garden number followed, after a blank space, by the assessment of the whole garden area as 'safe' or 'vulnerable'. Gardens are assigned numbers, starting with the value 1, according to the order of their appearance in the input data, and must appear in that order in the output.

Sample Input

```
5 3 2
4 10 8 4 2
12 4 4 6 1
4 4 2 5 1
1 8 1 3 1
1 1 1 3 5
1 11 3 3
12 10 4 4
7 3 4 7
1 3 1
1000 2000 1 1 1000
2000 2000 1 1
2001 2000 1 1
2000 1999 1 1
0 0 0
```

Sample Output

```
Test 1
1 vulnerable
2 safe
3 safe
Test 2
1 safe
2 vulnerable
3 vulnerable
```