

# The Amazing Human Cannonball

**Problem ID:** humancannonb

**CPU Time limit:** 1 second

**Memory limit:** 1024 MB

**Difficulty:** 1.4

The amazing human cannonball show is coming to town, and you are asked to double-check their calculations to make sure no one gets injured! The human cannonball is fired from a cannon that is a distance  $x_1$  from a vertical wall with a hole through which the cannonball must fly. The lower edge of the hole is at height  $h_1$  and the upper edge is at height  $h_2$ . The initial velocity of the cannonball is given as  $v_0$  and you also know the angle  $\theta$  of the cannon relative to the ground.

Thanks to their innovative suits, human cannonballs can fly without air resistance, and thus their trajectory can be modeled using the following formulas:

$$x(t) = v_0 t \cos \theta$$
$$y(t) = v_0 t \sin \theta - \frac{1}{2} g t^2$$

where  $x(t), y(t)$  provides the position of a cannon ball at time  $t$  that is fired from point  $(0, 0)$ .  $g$  is the acceleration due to gravity ( $g = 9.81 \text{ m/s}^2$ ).

Write a program to determine if the human cannonball can make it safely through the hole in the wall. To pass safely, there has to be a vertical safety margin of 1 m both below and above the point where the ball's trajectory crosses the centerline of the wall.

## Input

The input will consist of up to 100 test cases. The first line contains an integer  $N$ , denoting the number of test cases that follow. Each test case has 5 parameters:  $v_0 \theta x_1 h_1 h_2$ , separated by spaces.  $v_0$  ( $0 < v_0 \leq 200$ ) represents the ball's initial velocity in m/s.  $\theta$  is an angle given in degrees ( $0 < \theta < 90$ ),  $x_1$  ( $0 < x_1 < 1000$ ) is the distance from the cannon to the wall,  $h_1$  and  $h_2$  ( $0 < h_1 < h_2 < 1000$ ) are the heights of the lower and upper edges of the wall. All numbers are floating point numbers.

## Output

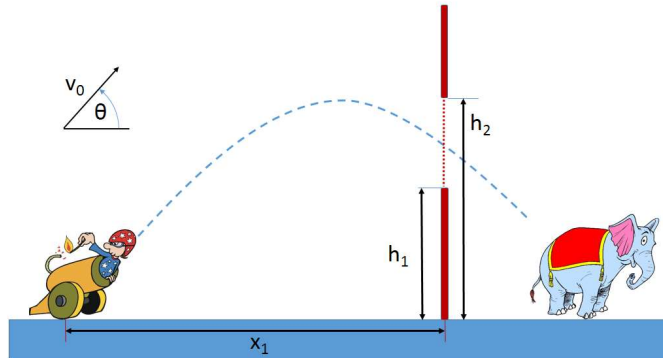
If the cannon ball can safely make it through the wall, output "Safe". Otherwise, output "Not Safe"!

### Sample Input 1

```
11
19 45 20 9 12
20 45 20 9 12
25 45 20 9 12
20 43 20 9 12
20 47.5 20 9 12
20 45 17 9 12
20 45 24 9 12
20 45 20 10 12
20 45 20 9 11
20 45 20 9.0 11.5
20 45 18.1 9 12
```

### Sample Output 1

```
Not Safe
Safe
Not Safe
Not Safe
Not Safe
Not Safe
Not Safe
Not Safe
Not Safe
Safe
Safe
```



Source: picgifs.com

**Author(s):** Godmar Back

**Source:** 2015 Virginia Tech H School Programming Contest

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