

Program Name: biath2.java

Input File: biath2.in

Calculate the times of competitors in an Olympic biathlon and award the gold, silver, and bronze medals.

This is similar to the preceding problem, with the exception that hit/miss results are given for only the first 19 of 20 firing range targets. A bullet heading is all that is given for the final target, which is 50 meters away with a diameter of 45 millimeters. You must use the heading to determine if the last target was hit or missed.

### Input

The first line of input will contain a single integer  $n$  indicating the number of data sets to process. The remainder of the input consists of those  $n$  data sets.

Each data set will consist of:

1. A line containing a single integer,  $m$ , indicating the number of competing athletes (always at least 3).
2. One line for each athlete, containing the following space-separated tokens:
  - Name – no more than 20 characters
  - Wall-clock Time – number of seconds between course start and stop times, given to the nearest hundredth of a second.
  - Targets Hit – number of the first 19 targets that were hit.
  - Bullet Heading – the heading of the final bullet fired at the final target, in the format  $(i,y)$ , where  $i$  is the angle of inclination and  $y$  is the angle of yaw, both in degrees with up to 4 decimal places of precision. Inclination is positive for up, negative for down. Yaw is positive for a shot to the right, negative to the left. Assume that the bullets travel in a straight line and that target center would be hit if a the heading were  $(0,0)$ .

Note: Bullets are considered as points (i.e., they have no radius) for the purposes of this problem, and no bullet will exactly hit the edge of a target.

### Output

For each data set in the input display the following:

1. A single line, "Data Set #X" where X is 1 for the first data set, 2 for the second, etc.
2. One line for each athlete, in the same order as in the input, consisting of the following space-separated tokens:
  - Name
  - Total Time (Wall-clock Time + penalty time for missed targets) to the hundredth of a second
  - If the athlete receives a medal, display 'GOLD', 'SILVER', or 'BRONZE', as appropriate.

Note: The sample data for this problem only matches that of the previous problem for purposes of comparison. The judge data will not follow this pattern.

Note: There will be no ties.

**Example Input File**

```
2
3
Beth 2500.95 17 (0,0)
Laura 2550.73 18 (0,0.02)
Holly 2400.33 15 (-0.1,0)
4
Beth 2500.95 17 (0,0)
Laura 2550.73 18 (0,0.02)
Holly 2400.33 15 (-0.1,0)
Zippy 1000.80 0 (1,-1)
```

**Example Output To Screen**

```
Data Set #1
Beth 2620.95 SILVER
Laura 2610.73 GOLD
Holly 2700.33 BRONZE
Data Set #2
Beth 2620.95 BRONZE
Laura 2610.73 SILVER
Holly 2700.33
Zippy 2200.80 GOLD
```