Problem I - Inaccurate Rectangles

David and Daniel got bored of the arcade and the beach, so they decided to play a good old fashioned guessing game.

David picked a rectangle in the plane, and challenged Daniel to guess the rectangle within 100 guesses.

Figure 1: A rectangle.

Input and Output

Note: this is an *interactive problem*. When you want to send a message to the judge, write to *stdout* and when you want to read a message from the judge, read from *stdin*. You must flush the output buffer after every write to *stdout*. In C++ and Java you can do one of the following:

- C/C++ `scanf/printf`: `fflush(stdout)`
- C/C++ `cin/cout`: `cout << flush` or `cout << endl`
- Java `System.out`: just use `System.out.println()`
- Java `PrintWriter`: `writer.flush()`

Notation: $[x_1, x_2] \times [y_1, y_2]$ denotes the axis-aligned rectangle with corners $(x_1, y_1), (x_1, y_2), (x_2, y_2), (x_2, y_1)$.

First the judge sends you a single integer T – the number of test cases.

Each test case begins with a message from the judge containing a single integer n ($1 \leq n \leq 1000$), denoting that there exists a single axis-aligned rectangle R with integer coordinates and non-zero area sitting inside the square $[0, n] \times [0, n]$ on the 2D plane.

After receiving n, you can make up to 100 queries of the following type to the judge by printing to *stdout*:

- $Q\ x_1\ y_1\ x_2\ y_2$: judge responds with the total area inside the rectangle $[x_1, x_2] \times [y_1, y_2]$ covered by R. Your query must satisfy $0 \leq x_1 \leq x_2 \leq n$ and $0 \leq y_1 \leq y_2 \leq n$.

Use these queries to determine the location and size of the rectangle R.

When you are ready to output the answer, print $A\ x_1\ y_1\ x_2\ y_2$ where the four integers indicates you determined that R is the rectangle $[x_1, x_2] \times [y_1, y_2]$.

You will receive an "Incorrect Output" verdict if you send a query with an invalid rectangle, send too many queries, or output incorrect answer. If your program hangs by waiting for judge message when non exists, you will receive a "Time Limit Exceeded" verdict.

The judge responds with -1 for a query if the rectangle given is invalid or or if you made more than 100 queries for the test case. The judge will not respond to the query if it does not follow the above format, which may cause your program to hang and receive a "Time Limit Exceeded" verdict.

Sample Interaction

Here is an example of how you could interact with the judge:

Judge sends	You send
1	
3	
	Q 0 0 3 3
2	
	Q 0 0 2 3
2	
	Q 0 0 1 3
1	
	Q 1 0 2 3
1	
	Q 0 1 2 3
0	
	A 0 0 2 1