ACM International Collegiate Programming Contest
2004 East Central Regional Practice Contest
Ashland University
Carnegie Mellon University
Sheridan University
University of Cincinnati
November 5, 2004

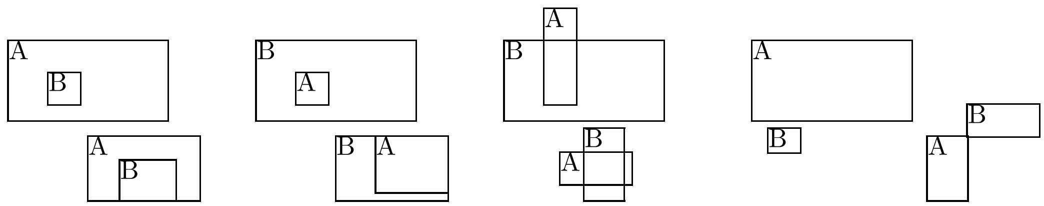
Sponsored by IBM

Rules:

1. There are **three** questions to be completed in **one hour and 30 minutes**.
2. All questions require you to read the test data from standard input and write results to standard output. You cannot use files for input or output. Additional input and output specifications can be found in the General Information Sheet.
3. The allowed programming languages are C, C++ and Java.
4. All programs will be re-compiled prior to testing with the judges' data.
5. Non-standard libraries cannot be used in your solutions. The Standard Template Library (STL) and C++ string libraries are allowed. The standard Java API is available, except for those packages that are deemed dangerous by contest officials (e.g., that might generate a security violation).
6. Programming style is not considered in this contest. You are free to code in whatever style you prefer. Documentation is not required.
7. All communication with the judges will be handled by the PC^2 environment.
8. Judges' decisions are to be considered final. No cheating will be tolerated.

Problem A: Disputed Claims

Kyle Pickett works in the county office and is in charge of land ownership in his county. When two people make claims on the same area of land, it is up to Kyle to determine who is the rightful owner. All land claims are conveniently in the shape of rectangles aligned along the north-south and east-west axes. When two people bring in claims, the first thing Kyle needs to do is to determine whether or not there is any overlap between them. Assuming that A and B are the two claims of land, there are four scenarios of interest to Kyle: A completely surrounding B, B completely surrounding A, A and B overlapping (but neither surrounding the other) and A and B not overlapping. The pictures below show two examples each of all four cases. Note that if A and B intersect at only a point or line they are considered non-overlapping.



A surrounds B B surrounds A A and B overlap A and B do not overlap

For this problem, you will read in descriptions of two rectangular claims, and determine which of the four cases is true.

Input

There will be multiple input sets. The first line of the input will be an integer n indicating the number of input sets. Each input set will consist of a single line containing 8 non-negative integers:

$$x1_A \;\; y1_A \;\; x2_A \;\; y2_A \;\; x1_B \;\; y1_B \;\; x2_B \;\; y2_B$$

where $x1_A, y1_A$ are the coordinates of the lower left corner of A's claim, and $x2_A, y2_A$ are the upper right corner of A's claim. The remaining four values are the corresponding corners of B's claim. All claims will have non-zero area (pretty ridiculous claim otherwise!).

Output

For each input set, output either the phrase `A surrounds B`, `B surrounds A`, `A and B overlap` or `A and B do not overlap`. The two claims will never be identical.

Sample Input

```
3
10 10 20 20 12 0 14 18
0 0 5 5 0 0 6 6
0 0 5 5 0 5 5 10
```

Sample Output

```
A and B overlap
B surrounds A
A and B do not overlap
```

Problem B: Palindrome Problem El Borpem Ord Nilap

A palindrome is a word or phrase which is spelled the same backwards and forwards (ignoring any punctuation and whitespace). Some famous palindromes include

> Madam, I'm Adam.
> A man, a plan, a canal: Panama!
> Go hang a salami, I'm a lasagna hog.

For this problem, you will read in a string of text and determine whether or not it is a palindrome.

Input

There will be multiple input sets. Each set will consist of one line of text of no more than 80 characters. The last line of the file will contain the sentence `THE END.` and should not be processed

Output

For each input set, output either the word `Yes` or the word `No` depending on whether the input string is a palindrome or not.

Sample Input

```
Go hang a salami, I'm a lasagna hog.
East Central Regional Programming Contest
     Dennis            sinned
THE END.
```

Sample Output

```
Yes
No
Yes
```

Problem C: Simple Statistics

Given a set of numerical data, there are several ways in which to describe it. One way is the so-called *5-number summary*. The five numbers used to describe the data set are the following: the minimum value, the first quartile, the median, the third quartile and the maximum value. The definition of the minimum and maximum values are obvious. The *median* of a set of numbers is the value of the number which would lie exactly in the middle of the set if it were sorted. For example, the median of the data set $7, -1, 9, 4, 1$ would be 4. If there is an even number of values in the set, then the median is the average of the two values closest to the middle; if our set contained the values $7, -1, 9, 4, 1, 0$ then the median would be $(1 + 4)/2 = 2.5$.

The definition of the quartiles follows naturally from the definition of the median. If we take all the values that come before the median in the sorted list (in the case when we average two values for the median this set would include the lower of those two numbers) the first quartile is the median of this set. The definition of the third quartile is identical except it uses those values that come after the original median. In our example above with $7, -1, 9, 4, 1, 0$, the first quartile value would be 0 (the median of the value -1, 1 and 0 which are less than 2.5) and the third quartile would be 7. If the data set contained $1, 2, 2, 2, 3$ (in any order), then the median would be 2, and the first and third quartiles would be 1.5 and 2.5, respectively. One special case is when there is only one element in the list, in which case the quartiles are equal to the median.

One other way to characterize data is its *skewness*. A distribution is considered *right-skewed* whenever the maximum value is farther from the median than the minimum value, or when the maximum and minimum are equally distant from the median, but the third quartile is farther from the median than the first quartile. A *left-skewed* distribution is one with the opposite situation. For our purposes, a distribution which is neither left-skewed nor right-skewed is considered *symmetric*. Your task for this problem is to read in various sets of numbers and output the 5-number summary for each, along with the skewness of the data.

Input

There will be multiple input sets. Each input set will consist of a single line of the form

$$n\ v_1\ v_2\ v_3\ \ldots\ v_n$$

where n is the number of data values, and $v_1, \ldots, v_n$ are the values. All the values will be integers and the maximum value for n will be 100. A line which begins with 0 indicates end of input and should not be processed.

Output

For each input set, output the 5-number summary and skewness in the order minimum, first quartile, median, third quartile, maximum and skew, with a single space between each. Skew will either be the phrase `right-skewed`, `left-skewed` or `symmetric`.

Sample Input

```
6 7 -1 9 4 1 0
15 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
15 15 14 13 12 11 10 9 8 7 6 5 4 3 2 0
0
```

Sample Output

```
-1 0 2.5 7 9 right-skewed
1 4 8 12 15 symmetric
0 4 8 12 15 left-skewed
```