X

Courses » **Design and Analysis of Algorithms**

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Week 2 Programming Assignment

Due on 2019-02-16, 23:59 IST

- Select your language (C/C++/Java/Python2/Python3)
- Paste your code into the submission window.
- There are some public test cases and some (hidden) private test cases.
- "Compile and run" will evaluate your submission against the public test cases.
- "Submit" will evaluate your submission against the hidden private test cases and report a score on 100. There are 10 private testcases in all, each with equal weightage. You will only get a score on 100. You will not get feedback on which private testcases passed or failed.
- Ignore warnings about "Presentation errors".

The Siruseri Singing Championship

(Zonal Computing Olympiad 2019)

The Siruseri Singing Championship is going to start, and Lavanya wants to figure out the outcome before the tournament even begins! Looking at past tournaments, she realizes that the judges care only about the pitches that the singers can sing in, and so she devises a method through which she can accurately predict the outcome of a match between any two singers.

She represents various pitches as integers and has assigned a lower limit and an upper limit for each singer, which corresponds to their vocal range. For any singer, the lower limit will always be less than the upper limit. If a singer has lower limit L and upper limit U (L < U), it means that this particular singer can sing in all the pitches between L and U, that is they can sing in the pitches {L, L+1, L+2, …, U}.

The lower bounds and upper bounds of all the singers are distinct. When two singers S_i and S_j with bounds (L_i, U_i) and (L_j, U_j) compete against each other, S_i wins if they can sing in every pitch that S_j can sing in, and some more pitches. Similarly, S_j wins if they can sing in every pitch that S_i can sing in, and some more pitches. If neither of these conditions are met, the match ends in a draw. *In this problem, you can assume that no match ends in a draw*.

N singers are competing in the tournament. Each singer competes in N-1 matches, one match against each of the other singers. The winner of a match scores 2 points, and the loser gets no points. But in case of a draw, both the singers get 1 point each.

You are given the lower and upper bounds of all the N singers. You need to output the total scores of each of the N singers at the end of the tournament.

Solution hint

Since no match ends in a draw, for any pair of singers S_i and S_j, one of their vocal ranges is strictly included in the other. Deduce that, across all singers, the vocal ranges form a sequence where each interval is strictly included in the previous one. You can then sort the starting points of the vocal ranges and determine how many matches each singer wins from the position of their starting point in this sorted sequence.

Input format

The first line of of the input contains a single integer, N, which is the number of singers. N lines follow, the i-th of which contains two space-separated integers: L_i and U_i, which correspond to the lower bound and upper bound of the i-th singer.

Output format

Output a single line containing N space-separated integers, the i-th of which should be score of the i-th singer at the end of the tournament.

Test data

- $2 \le N \le 10^5$.
- $1 \le L_i < U_i \le 10^9$.
- All the 2N integers (lower bounds and upper bounds) are distinct.
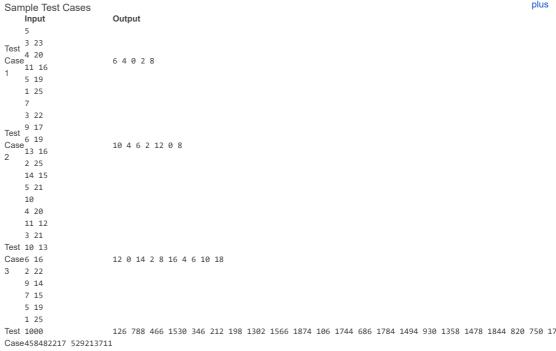- No matches end in a draw.

Sample input 1

```
5
3  23
4  20
11  16
5  19
1  25
```

Sample output 1

Sample output 1

6 4 0 2 8

Sample input 2

7
3 22
9 17
6 19
13 16
2 25
14 15
5 21

Sample output 2

10 4 6 2 12 0 8

Sample Test Cases

	Input	Output
Test Case 1	5 3 23 4 20 11 16 5 19 1 25	6 4 0 2 8
Test Case 2	7 3 22 9 17 6 19 13 16 2 25 14 15 5 21	10 4 6 2 12 0 8
Test Case 3	10 4 20 11 12 3 21 10 13 6 16 2 22 9 14 7 15 5 19 1 25	12 0 14 2 8 16 4 6 10 18
Test Case 4	1000 458482217 529213711 306181905 692908698 381488668 613473266 116383718 888577434 409691371 583032535 440442030 553244458 442045368 548177147 170565706 831486954 109102235 893508913 25659032 968351289 464788423 524559788 58187937 928413563 327847094 663851401 45040819 940938348 123373321 877489478 266376975 733449682 158728118 840803670 128098808 871640720 31925872 957165157 298450657 703619863 314922396 678939399 50253940 936531854 121344520 883168573 306890639 690764345 378088699 616751649 183691920 816248153 131189178 868055759 138583557 860020671 2230019 992340977 301768399 700666621 213114005 776314619 241518517 749361131 44833677 942747639 452177325 540049650 61026274 926551968 313739731 680160420 69066013 921994042 204258614 784941571 101488655 900015046	126 788 466 1530 346 212 198 1302 1566 1874 106 1744 686 1784 1494 930 1358 1478 1844 820 750 17

```
160983138 836698079
56416559 945170647
421302227 562805689
44360460 956020552
89890655 910708598
335459134 648497560
75654032 926227811
322021005 663399096
156502173 840153540
374058170 609465756
189533873 804776931
456744660 526634637
133410912 865242292
53570016 946729836
343450813 638876453
389105805 595165661
421572042 562592115
341013045 641909735
76908438 925347877
384327727 598769407
10967230 987175788
270018443 720727048
153676824 843209351
153269807 843590422
419594446 564964256
16036487 983089088
44770919 955763561
460154143 522665111
168654327 827931698
97797740 901955303
285468484 705552811
339789105 643116271
325816358 659246221
223223355 767266604
11539935 986632208
300477640 687553823
```

Due Date Exceeded.
10 out of 10 tests passed.
You scored 100.0/100.

Your last recorded submission was :

```cpp
 1  #include<iostream>
 2  #include<vector>
 3  #include<iterator>
 4  #include<algorithm>
 5  using namespace std;
 6  vector<int> c,A,B;
 7
 8  int main(){
 9      ios::sync_with_stdio(false);
10      cin.tie(0);
11      cout.tie(0);
12      int n;
13      cin>>n;
14      A.resize(n),B.resize(n);
15      vector<int>::iterator it;
16      for(int i=0;i<n;++i)cin>>A[i],cin>>B[i],c.push_back(A[i]);
17      sort(c.begin(),c.end());
18      for(int i=0;i<n;++i){
19          it=upper_bound(c.begin(),c.end(),A[i]);
20          B[i]=(c.end()-it)*2;
21      }
22      for(int i=0;i<n;++i)
23       cout<<B[i]<<" ";
24      cout<<endl;
25  }
26
27
28
29
30
31
```

Sample solutions (Provided by instructor)

Select the Language . [C++ ▼]

End ▶

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