

The background of the entire image is a dark blue field filled with a pattern of red dots. These dots are arranged in a way that they form a large, faint, stylized circular shape in the center, with the density of the dots increasing towards the center.

HUST

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Applied Algorithm Lab

Disjoint segment

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- Find maximal number of disjoint segments from a given set.
- **Input:** A line and a set of segments on the line:

$$X = \{(a_1, b_1); \dots; (a_n, b_n)\}, \text{ where } a_i < b_i$$

- **Objective:** Find a subset of X containing disjoint segment and largest cardinality
- **Output:** the largest cardinality found

- Example

stdin	stdout
6 0 10 3 7 6 14 9 11 12 15 17 19	4 Explain: (3,7), (9,11), (12,15), (17,19)

- Idea to solve: use greedy approach
 - **Observation**
 - Choose from left to right: prioritize the interval that ends earliest → this “saves space” for later intervals.
 - Sort the intervals in ascending order of their end time.
 - Traverse through the intervals and check if an interval satisfies the condition; if yes, add it to the subset.
 - **Auxiliary variable**
 - last: stores the end point of the previously selected interval.
 - **Selection condition**
 - An interval is selected if $\text{begin} > \text{last}$.

Disjoint segment - Implementation

```
1  #include <bits/stdc++.h>
2  using namespace std;
3
4  typedef pair<int, int> ii;
5  vector<ii> ab;
6  int n, nbSegment = 0;
7
8  void input() {
9      ios_base::sync_with_stdio(0);
10     cin.tie(0); cout.tie(0);
11     cin >> n;
12     ab.resize(n);
13     for (int i = 0; i < n; i++) {
14         cin >> ab[i].first >> ab[i].second;
15     }
16 }
```


Disjoint segment - Implementation

```
18  int main() {
19      input();
20      int last = -1;
21      sort(ab.begin(), ab.end(), [](ii a, ii b) {
22          return a.second < b.second;
23      });
24
25      for (int i=0; i<n; i++) {
26          if (ab[i].first > last) {
27              last = ab[i].second;
28              nbSegment++;
29          }
30      }
31      cout << nbSegment << endl;
32      return 0;
33 }
```



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THANK YOU !