Introduction to Algorithms Assignment1

Due Date: 2018/04/13 23:59:59

Name a program young_tableau and a folder with your student ID.

Please hand in your project file(.c or .cpp or .java or .py) and report as STUDENT_ID.zip to e3 platform. (example: 0656602.zip)

Language: C 、 C++ 、 Java 、 Python

If you have any questions, you can email TAs or come to EC126 after email

Score:

If you pass the given data, you get 30% each problem. Another 20% will be gotten if you pass the hidden data.

Young tableaus (p.167)

Definition:

An m × n Young tableau is an m × n matrix such that the entries of each row are in sorted order from left to right and the entries of each column are in sorted order from top to bottom. Some of the entries of a Young tableau may be ∞ , which we treat as nonexistent elements. Thus, a Young tableau can be used to hold r <= mn finite numbers.

e.g.

$$
\begin{matrix}
2 & 3 & 12 & 14 \\
4 & 8 & 16 & \infty \\
5 & 9 & \infty & \infty \\
\infty & \infty & \infty & \infty
\end{matrix}
$$

1. Design a program to insert a new element into a nonfull m × n Young tableau.

Hint: m × n Young tableau Y is empty if Y [1, 1] =∞ .Y is full (contains mn elements) if Y [m,n] < ∞(represent ∞ as x) (50%)

2 (means two young tableaus)

1 (means use insert method)

6 7 (Insert 6, 7)

2 3 12 14

4 8 16 x

5 9 x x

x x x x

1

13

1 3 5

2 4 7

6 9 14

11 12 x

Output:

Insert 6 7

2 3 6 14

4 7 8 16

5 9 12 x

x x x x

Insert 13

1 3 5

2 4 7

6 9 13

11 12 14

2. Design a program to implement EXTRACT-MIN on a nonempty m × n Young tableau (represent ∞ as x)(50%)

2(means two young tableaus)

2(means use extract-min method)

2 3 12 14

4 8 16 x

5 9 x x

x x x x

2

1 3 5

2 4 7

6 9 14

11 12 x

Output:

Extract-min **2**

3 8 12 14

4 9 16 x

5 x x x

x x x x

Extract-min 1

2 3 5

4 7 14

6 9 x

11 12 x