Exercise #1 Spec

Due Date: 2023/11/15 12:00:00

Young tableaus (p.167)

Definition:

An m × n Young tableau is an m × n (m,n∈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.

2	3	12	14
4	8	16	∞
5	9	∞	∞
∞	∞	∞	∞

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

(Only provide the means of input and output. Please check format of input and output file.)

Rule of programing and the dataset:

(1) Element type is Integer.
(2) Cannot use the already existed sort API.
(3) Do not handle the empty and full exception.
(4) There are many solutions, you only print one of them.
(5) Input and output txt file automatically and the relative path is beside the main program.
(6) Cannot use not standard header file or you should attach on your zip.

Exercise #1 Submission Policy

- Language:
  C、C++
  (Please check your program can compile successfully by gcc/g++)
  (0 pts for other languages)
  (do not include bits/stdc++.h)

- Submission File
  - Main program
    You should name your file as Exercise1_STUDENT_ID.cpp/.c.
    Your program should use standard input / output.
  - Report
    a. Environment(OS, compiler version, IDE)
       - how to run your program
    b. Results
       - method or solutions
       - analyze the running time of your algorithm (time complexity of using scale)
       - anything you want to share
    c. Submit
       - Exercise1_STUDENT_ID.cpp/.c
       - Exercise1_STUDENT_ID.pdf

- Score:
  There will be 3 testing dataset, D1,D2 and D3. D1 is already provided in input.txt.
  - D1(60%) : If you pass the given data D1, you get 30 pts each problem
  - D2(20%) : If you pass the hidden data D2, you get 10 pts each problem
  - D3(20%) : If you pass the hidden data D3, you get 10 pts each problem
  - Report (5%)

  Total: 105
  - Penalty
    a. not use standard IO -10 pts
    b. output format error -5 pts
    c. filename error -5 pts
- Cheating Policies
  - 0 points for any cheating on assignments
  - Allowing another student to examine your code is also considered as cheating
- Late Submission
  Every week late from the due day will get 10% penalty. For example, if you submit the homework on 11/16, your final score will * 0.9. And if you submit it on 11/23, your final score will * 0.8.
- If you have any questions, you can email TAs or come to EC126 after email