Problem Solving Techniques 문제해결

Jinkyu Lee

Dept. of Computer Science and Engineering,
Sungkyunkwan University (SKKU)

Homework 3a

- 40 points for coding evaluation
  - Submission format
    - Your file should work on skku.goorm.io with gcc 11.1.0 complier
  - Submission site: https://skku.goorm.io
    - [Homework] 3a (code)
- 5 points for report
  - The report is not evaluated in detail but evaluated as Pass/Fail
  - Submission format: [Template] Report for exercise/homework
    - File name: yourid_HW3a.pdf
      - Example: 2000123456_HW3a.pdf
  - Submission site: https://icampus.skku.edu/
    - Week 8: [Homework] 3a (report)
- Due date: 5/3 23:59 (no late submission accepted)

Rules for homework

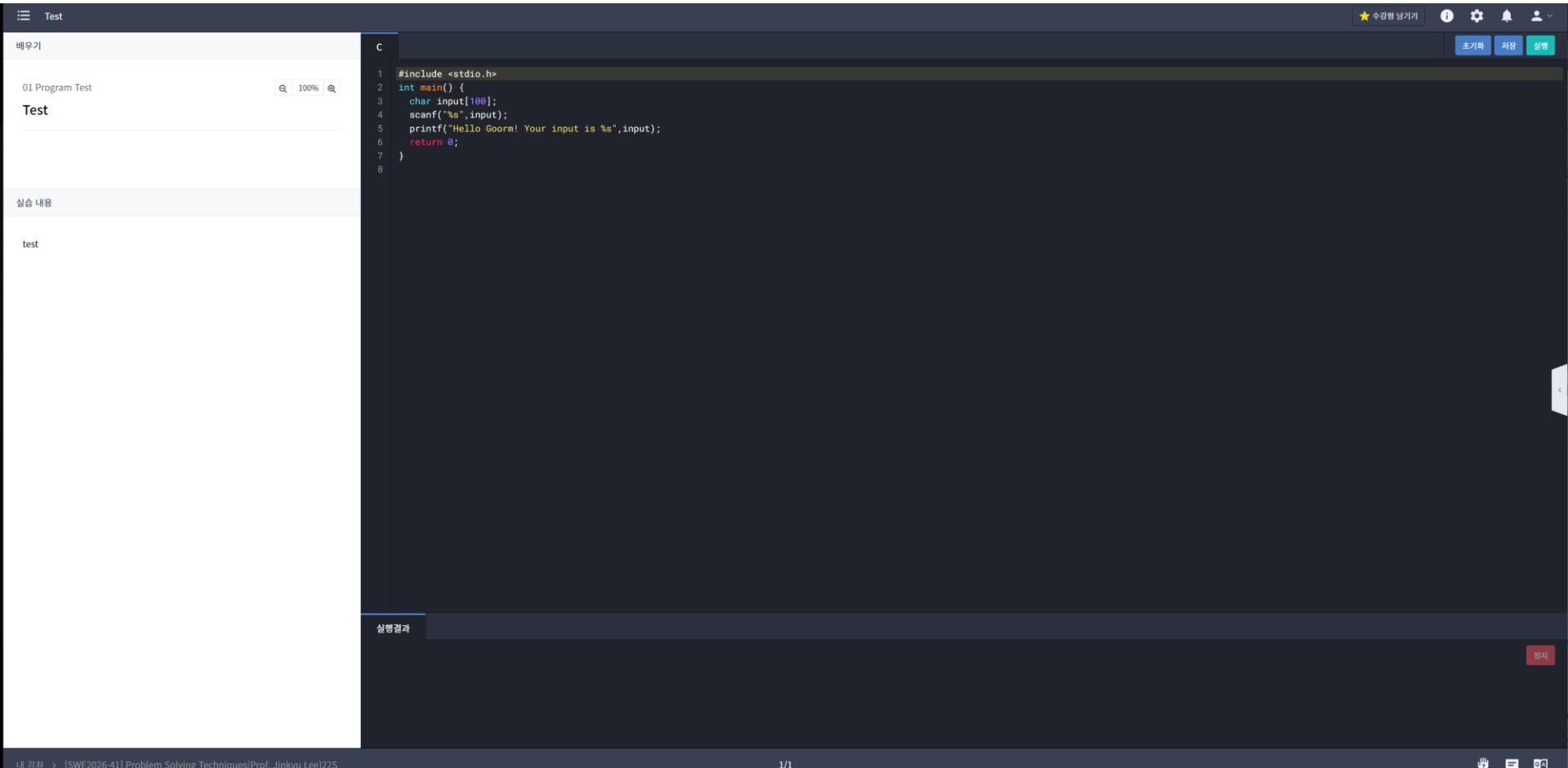
- You should follow instructions.
  - Complier
    - You will get no/less point if your program cannot be complied with the specified complier
  - Input/output format
    - You will get no/less point if TA's automatic evaluation program cannot parse your input or output.
  - Permitted modification scope
    - You will get no/less point if you modify code outside of the permitted modification scope
  - All other rules
    - You will get severe penalty or no/less point if you violate the given rules.

Complier for homework

- Complier
  - skku.goorm.io -> gcc 11.1.0

C language, not C++ language

  - Your program will be correctly evaluated *only if* your program works on skku.goorm.io with gcc 11.1.0 complier

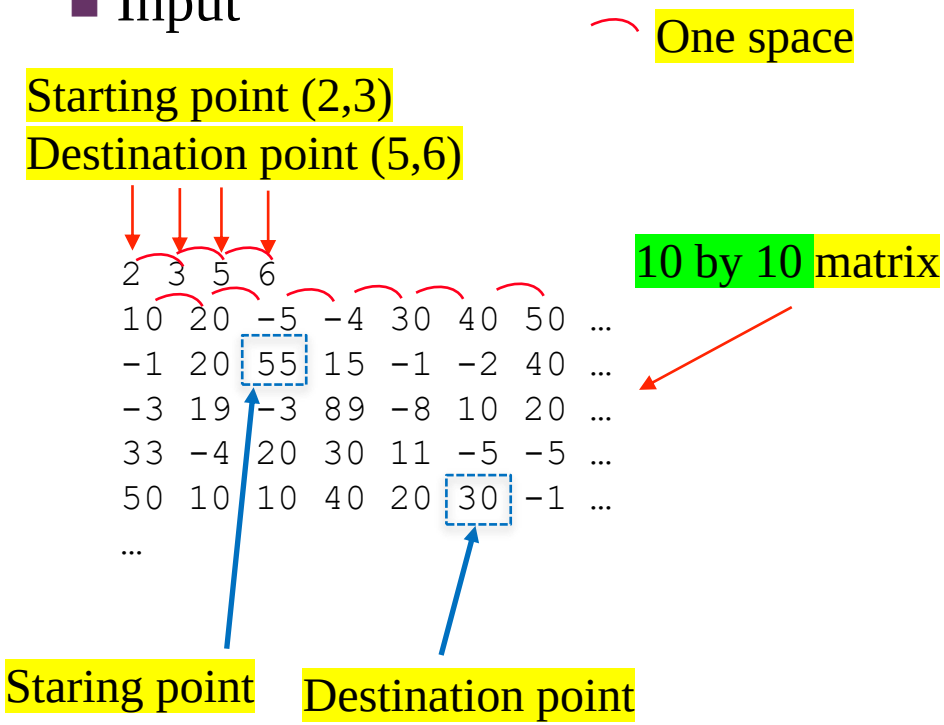


Problem

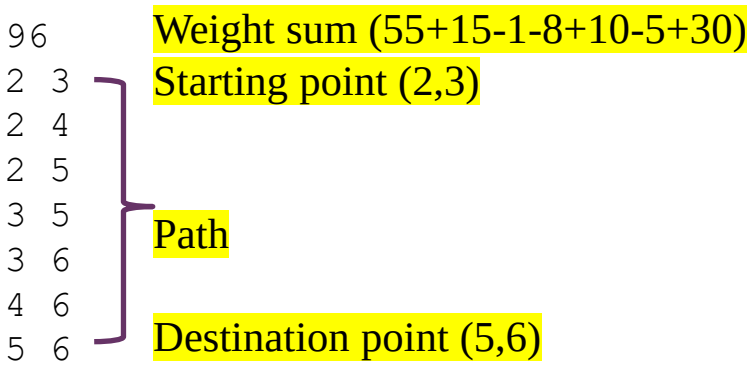
- Finding weight-sum-minimized *shortest* path
  - A square grid is represented by a 10-by-10 matrix, in which each point has a weight.
    - Each weight is an integer number between -100 and 100, or -9999.
    - If the weight is -9999, it means any pass cannot include the point.
  - A path has its starting point and destination point, each of which is represented by its row number and column number; the index starts from 1.
    - Any path cannot visit a single point more than once.
    - Any path contains at most one point whose weight is 0.
    - In any path, two consecutive points have *either* the same row number and one difference between the column numbers, *or* the same column number and one difference between the row numbers.
  - Goal: find the *shortest* path that minimizes the sum of weights of all points that the path passes.
    - Input: starting point indexes (the row and column number), and destination point indexes (the row and column number)
    - Output: the sum of weight, AND a series of point indexes from the starting point to the destination point including themselves.

Input/Output Format

Input



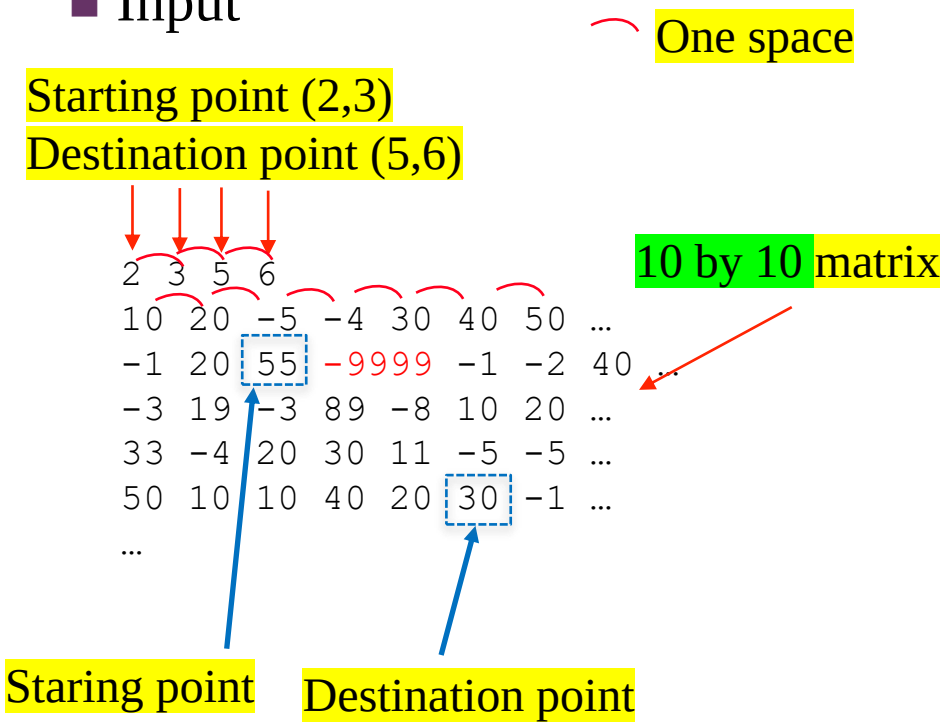
Output



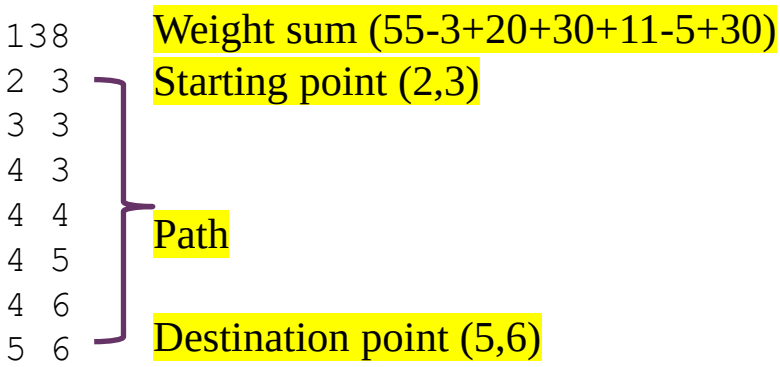
If you have multiple paths that yield the same sum of weight, print only one of them.

Input/Output Format

Input

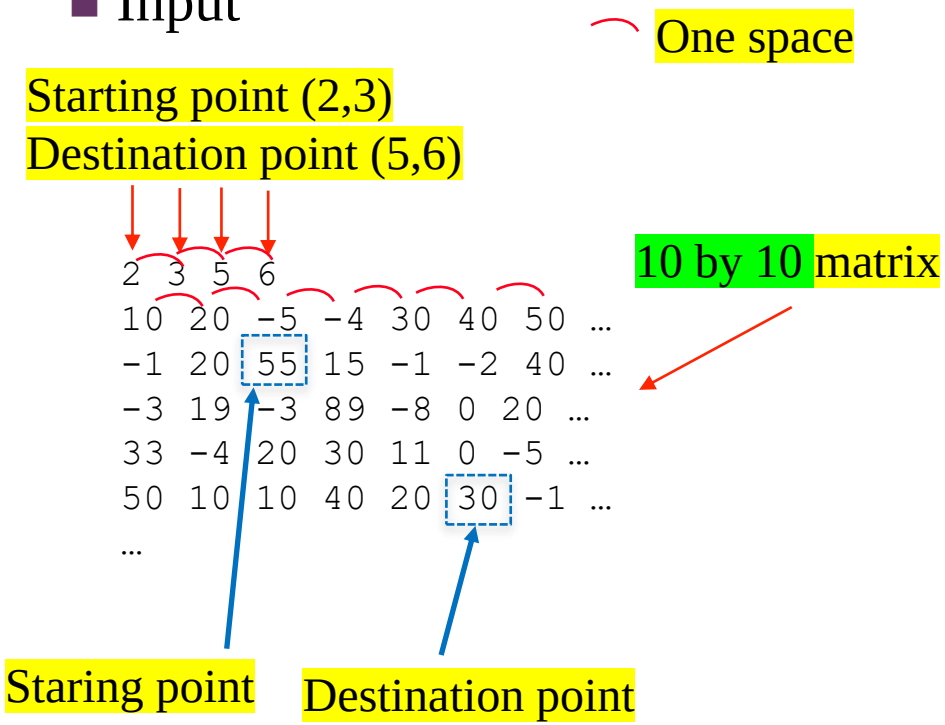


Output



Input/Output Format

Input



Output

```
102
2 3
2 4
2 5
3 5
4 5
4 6
5 6
```

Weight sum (55+15-1-8+11+0+30)

Starting point (2,3)

Path

Destination point (5,6)

```
Warning: the following is wrong
91
2 3
2 4
2 5
3 5
3 6
4 6
5 6
```

Because there are two points with weight zero

Input/Output Format

- TA will not evaluate any test case where output doesn't exist.

- Validity of output
  - It should be the shortest path, meaning that it passes the minimum number of points. This implicitly means that any path cannot visit a single point more than once.
  - Any path cannot include any point whose weight is -9999.
  - Any path cannot include two or more points whose weight is 0.
  - In any path, two consecutive points have *either* the same row number and one difference between the column numbers, *or* the same column number and one difference between the row numbers.

Template

- Template
  - No C code template

Evaluation

- Evaluation
  - TA will test several cases.
  - For each test case,
    - If your C code results in an answer within 10 seconds on skku.goorm.io with gcc 11.1.0 complier,
      - If your answer is correct (= is valid and minimizes the sum of weight),
        - You get 100%.
      - Else,
        - You get 0%.
    - Else,
      - You get 0%.

Before submission, test your program on skku.goorm.io with gcc 11.1.0 complier!
Otherwise, you may get zero point although your program works on your environment.