

Advanced Coding Practice

HW Problem #3

2023 Fall, CSE4152
Sogang University



Matrix Addition

There is a $N \times N$ matrix A initialized by arbitrary values. Given 5 values $R1, R2, C1, C2$ and V , there is a program like below. ($1 \leq R1, R2, C1, C2 \leq N$ integers, V : a real value)

```
for  $k := 1$  to  $N$  do  
    read ( $R1, R2, C1, C2, V$ );  
    for  $i := R1$  to  $R2$  do  
        for  $j := C1$  to  $C2$  do  
             $A[i][j] := A[i][j] + V$ ;  
        end  
    end  
end
```

If this program is executed, it takes $O(N^3)$ time. Design a more efficient method.

Half-Circle Property

There is an circle C centered at $(0,0)$ and there are many points on the circumference (원주) of the circle. Let us denote the set of points by S . If there exists a line L passing through point $(0,0)$ such that all points of S lie on the one side of L , then we say that S satisfies 'Half-circle property'. For a given set of point, design an algorithm that finds whether the set satisfies half-circle property or not. And compute its time and space complexity.

Example:

1st example: $(0.5, 1.0), (1.0, -0.5), (0.5, 1.0)$.

2nd example: $(0.5, 1.0), (1.0, -0.5), (-0.5, -1.0), (-1.0, 0.5)$.

Solution of Examples:

1st example point set satisfies half-circle property.

2nd example point set does not.

Example

Input

1 5 9 13 25

2 6 11 16 27

3 7 14 18 28

4 8 15 21 30

10 11 20 23 50

8 ; k = 8

Answer:

(4, 2) ; Position of 8