

Revision.

sort - Range.



~~Arrays. sort (A, x, y+1)~~

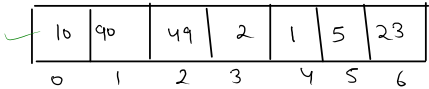
$[x, y+1)$
 $\hookrightarrow [x, y]$

Sort an array in wave form 1

$n=7$

Sample Input 0

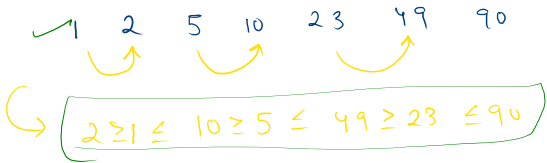
```
7
10 90 49 2 1 5 23
```



Sample Output 0

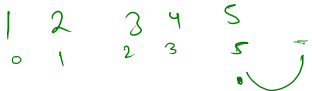
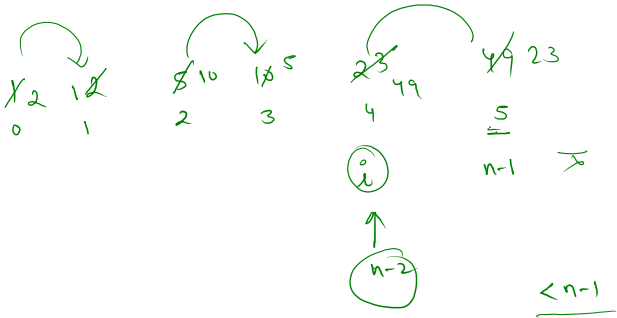
```
2 1 10 5 49 23 90
```

logic. 1. sort \rightarrow ascending order.



`arr[0] >= arr[1] <= arr[2] >= arr[3] <= arr[4] >= ...`

$n=6$



5 1 2 3 4 7 6

→ sort wave form

1. sort → ascending.

1 2 3 4 5 6 7
↖ ↗ ↖ ↗ ↖ ↗

wave
form

←

2	1	4	3	6	5	7
---	---	---	---	---	---	---

≥ ≤ ≥ ≤ ≥ ≤

2. steps approach.

1. sort.

2. swap alter.

```
public static void main(String[] args) {  
    /* Enter your code here. Read input from STDIN. Print output to STDOUT */  
    Scanner scn = new Scanner(System.in);  
    int n = scn.nextInt();  
    Integer [] A = new Integer[n];  
    for(int i = 0; i < n; i++){  
        A[i] = scn.nextInt();  
    }  
  
    //Step 1: Sort A  
    Arrays.sort(A);  
  
    //Step 2: Swap alternatively  
    for(int i = 0; i < n-1; i += 2){  
        int tmp = A[i];  
        A[i] = A[i+1];  
        A[i+1] = tmp;  
    }  
  
    //print ans  
    for(int i = 0; i < n; i++){  
        System.out.print(A[i] + " ");  
    }  
}
```

Subarray

↪ part of array which is continuous.

5
1 2 3 4 5

$n=5$

$$5 + 4 + 3 + 2 + 1$$

$$= \textcircled{15} \checkmark$$

$$\frac{n(n+1)}{2} = \frac{5(6)}{2} = \textcircled{15}$$

5 {
1
1 2
1 2 3
1 2 3 4
1 2 3 4 5
4 {
2
2 3
2 3 4
2 3 4 5

3 {
3
3 4
3 4 5
2 {
4
4 5
1 {
5

n element

↪ total subarray.

$$\frac{n + n-1 + n-2 + \dots + 1}{}$$

↪
$$\frac{n(n+1)}{2}$$

$n=2$

$\boxed{3 \ 7}$

$\textcircled{3}$

$\textcircled{7}$

$\textcircled{3 \ 7}$

$n=2$

$$= 2 + 1$$

$n=3$

$$= 3 + 2 + 1$$

factorial.

$$n! = 1 \cdot 2 \cdot 3 \cdot \dots \cdot n$$

$$S_n = \frac{n(n+1)}{2}$$

$$S_n = 1 + 2 + 3 + 4 + \dots + n$$

n=5

A

1	2	3	4	5
---	---	---	---	---

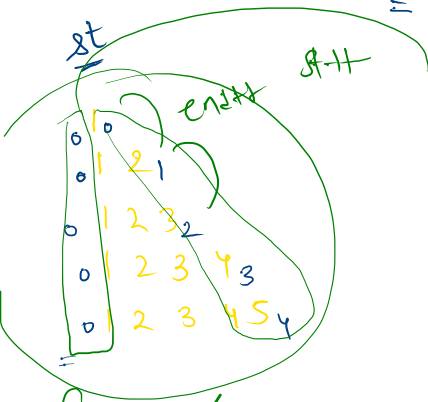
0

1

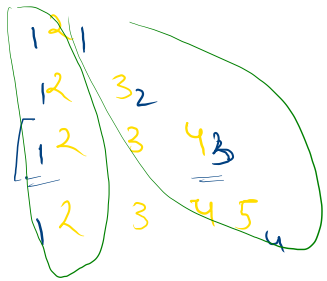
2

3

4 n-1



key-
st = 0
end = 0, 1, 2 ... n-1



st=1
end = 1 ... n-1

2 3 2

2 3 4 3

2 3 4 5 4

3 4

3 4 5 4

4 5 4

st=4
end 4...n-1

st=3

end = 3...n-1

st=2

end = 2...n-1



?

I need. to no. of.

$$\frac{n(n+1)}{2}$$

```
/* Enter your code here. Read input from STDIN. Print output to STDOUT */
Scanner scn = new Scanner(System.in);
int n = scn.nextInt();
Integer [] A = new Integer[n];
for(int i = 0; i < n; i++){
    A[i] = scn.nextInt();
}

//
for(int st = 0; st < n; st++){
    for(int end = st; end < n; end++){
        for(int k = st; k <= end; k++){
            System.out.print(A[k] + " ");
        }
        System.out.println();
    }
}
```


Sum Equals Zero

4

-1 1 2 3

$n=4$

$$\frac{4(5)}{2} = 10$$

-1
-1 1 ✓
-1 1 2
-1 1 2 3

1
1 2
1 2 3
2
2 3
3

eg
1 2 3

1
1 2
1 2 3

2
2 3

3

false.

eg.

2

3

1

-1

2

3

1

-1

2 3

3 1

1 -1

2 3 1

3 1 -1

2 3 1 -1

```
public static void main(String[] args) {  
    /* Enter your code here. Read input from STDIN. Print output to STDOUT */  
    Scanner scn = new Scanner(System.in);  
    int n = scn.nextInt();  
    Integer [] A = new Integer[n];  
    for(int i = 0; i < n; i++){  
        A[i] = scn.nextInt();  
    }  
  
    //  
    for(int st = 0; st < n; st++){  
        for(int end = st; end < n; end++){  
  
            int sum = 0;  
            for(int k = st; k <= end; k++){  
                // 1 2 3 4  
                sum += A[k];  
                // System.out.print(A[k] + " ");  
            }  
            if(sum == 0){  
                System.out.println("true");  
                return;  
            }  
        }  
    }  
    System.out.println("false");  
}
```

Kadane's Algo.

Input: `nums = [-2,1,-3,4,-1,2,1,-5,4]`

Output: 6

sum \uparrow
 $\text{sum} = \cancel{0} \cancel{-2} \cancel{1} \cancel{-3} \cancel{4} \cancel{3} \cancel{5} \cancel{6} \cancel{1} \cancel{5}$ $\rightarrow O(n)$ ans = $\cancel{0} \cancel{1} \cancel{4} \cancel{5} \cancel{6}$
 -2 $\textcircled{1}$ -3 $\boxed{4}$ -1 2 1 -5 4
 \uparrow

$$3 + 2 = 5$$

2

$sum \geq 0$ add
 $sum < 0$ start new

$$\text{sum} = \emptyset \quad \text{---} \quad -8 \quad -12 \quad -10$$

ans \rightarrow ~~$-\infty$~~ ~~$-\frac{1}{2}$~~

$$\begin{array}{cc} -8 & -2 \\ \uparrow & \uparrow \end{array}$$

-10
 -2

7-0