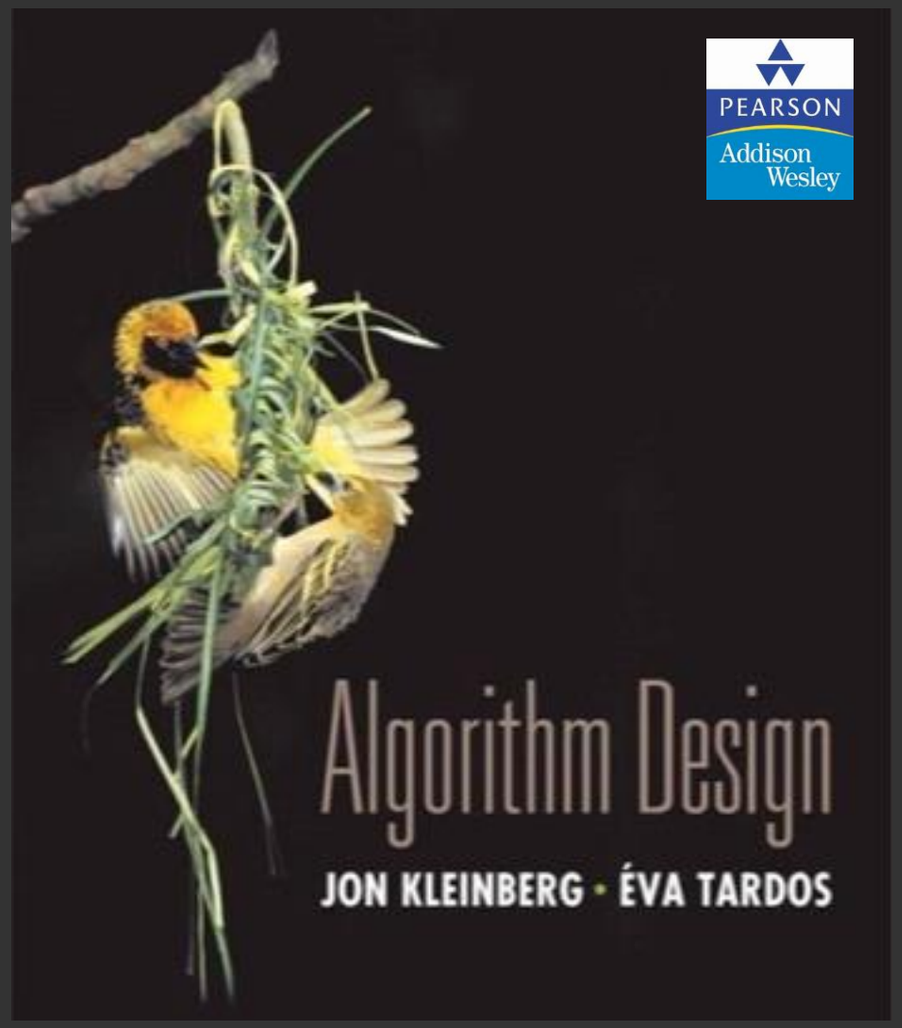


5. Divide and Conquer I

- *merge and count demo*

Lecture slides by Kevin Wayne

http://www.cs.princeton.edu/~wayne/kleinberg-tardos

Last updated on 15/9/12 下午10:41

Merge and count demo

Given two sorted lists A and B,

- Count number of inversions (a, b) with $a \in A$ and $b \in B$.
- Merge A and B into sorted list C.

sorted list A

3	7	10	14	18

sorted list B

2	11	16	17	23

Merge and count demo

Given two sorted lists A and B,

- Count number of inversions (a, b) with $a \in A$ and $b \in B$.
- Merge A and B into sorted list C.

sorted list A

3	7	10	14	18

sorted list B

2	11	16	17	23

compare minimum entry in each list: copy 2 and add x to inversion count

sorted list C

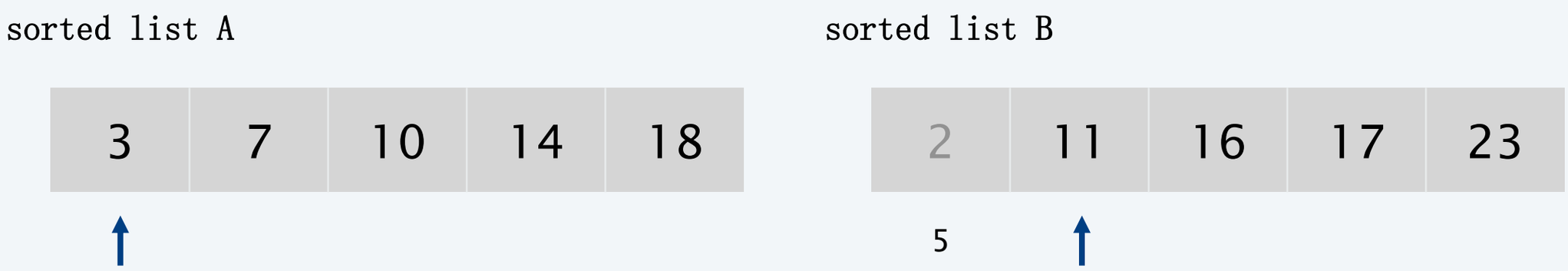
x = 5

inversions = 0

Merge and count demo

Given two sorted lists A and B,

- Count number of inversions (a, b) with $a \in A$ and $b \in B$.
- Merge A and B into sorted list C.



compare minimum entry in each list: copy 3 and decrement x

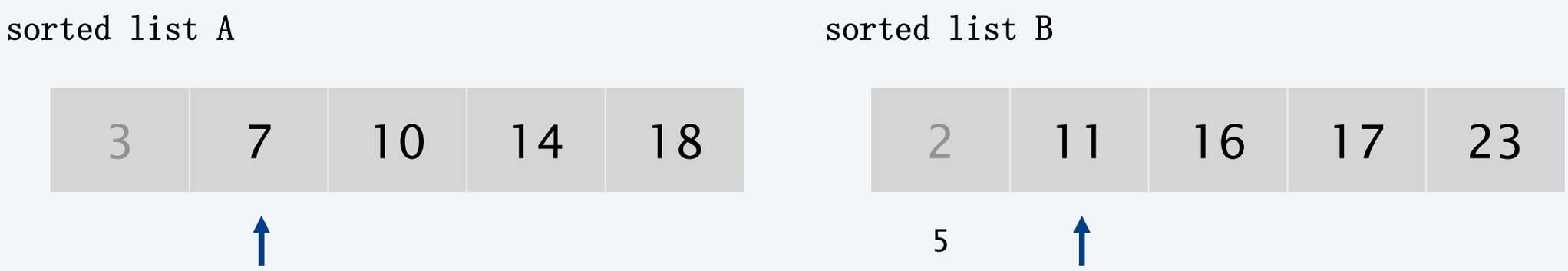
x = 5

inversions = 5

Merge and count demo

Given two sorted lists A and B,

- Count number of inversions (a, b) with $a \in A$ and $b \in B$.
- Merge A and B into sorted list C.



compare minimum entry in each list: copy 7 and decrement x

x = 4

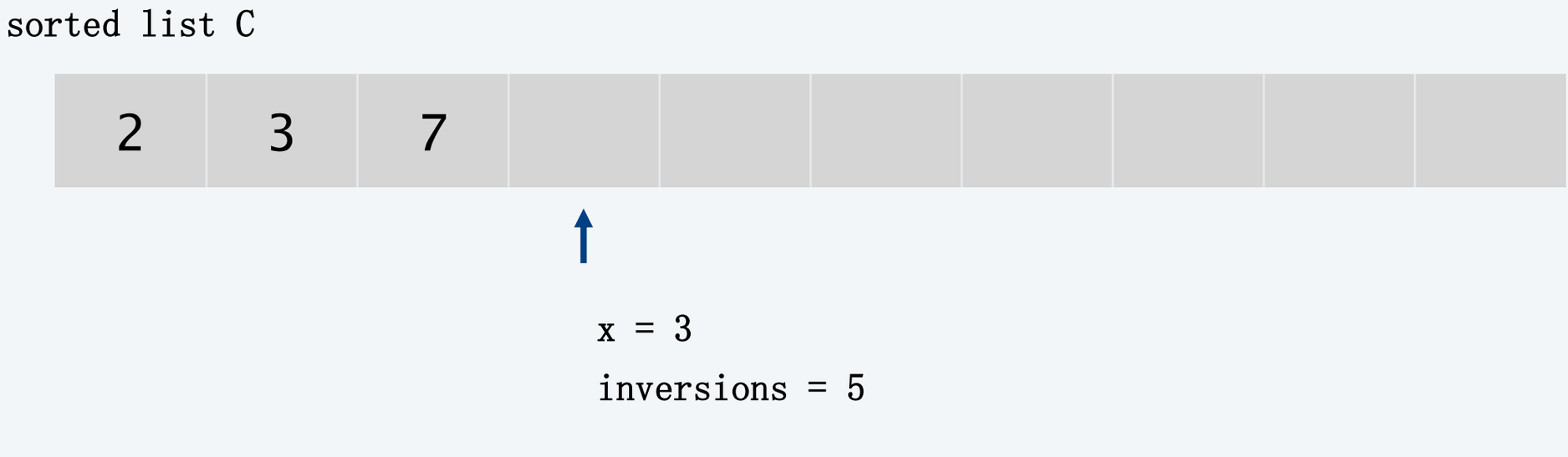
inversions = 5

Merge and count demo

Given two sorted lists A and B,

- Count number of inversions (a, b) with $a \in A$ and $b \in B$.
- Merge A and B into sorted list C.

compare minimum entry in each list: copy 10 and decrement x

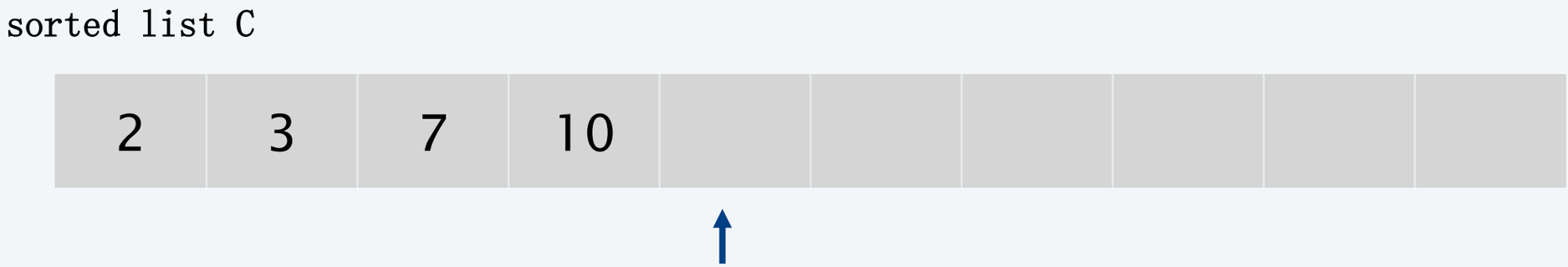


Merge and count demo

Given two sorted lists A and B,

- Count number of inversions (a, b) with $a \in A$ and $b \in B$.
- Merge A and B into sorted list C.

compare minimum entry in each list: copy 11 and add x to increment count

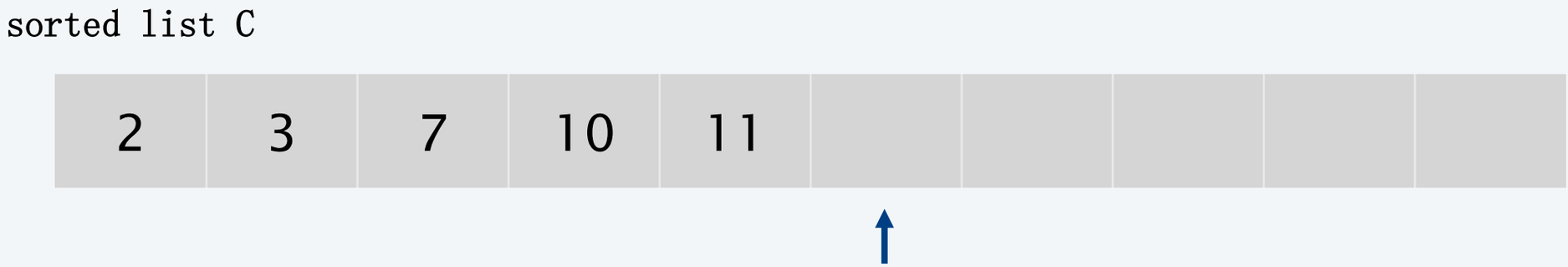


Merge and count demo

Given two sorted lists A and B,

- Count number of inversions (a, b) with $a \in A$ and $b \in B$.
- Merge A and B into sorted list C.

compare minimum entry in each list: copy 14 and decrement x



x = 2

inversions = 7

Merge and count demo

Given two sorted lists A and B,

- Count number of inversions (a, b) with $a \in A$ and $b \in B$.
- Merge A and B into sorted list C.

sorted list A

3	7	10	14	18

sorted list B

2	11	16	17	23

5 2

compare minimum entry in each list: copy 16 and add x to increment count

sorted list C

2	3	7	10	11	14				

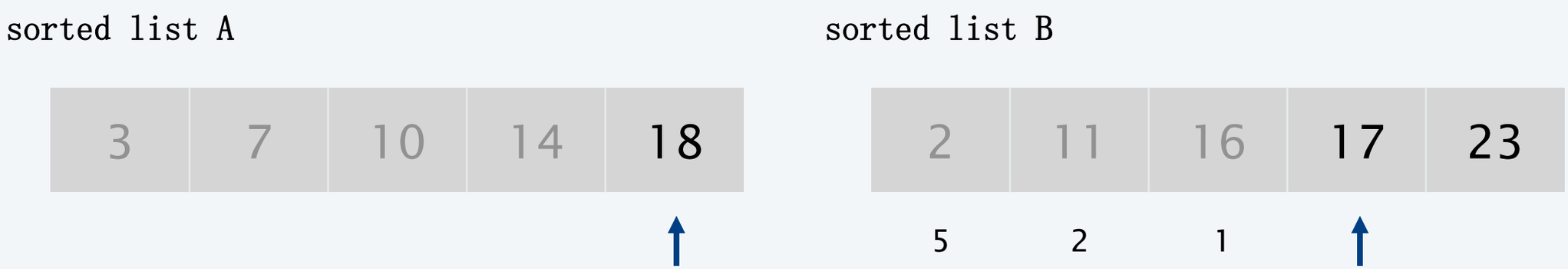
x = 1

inversions = 7

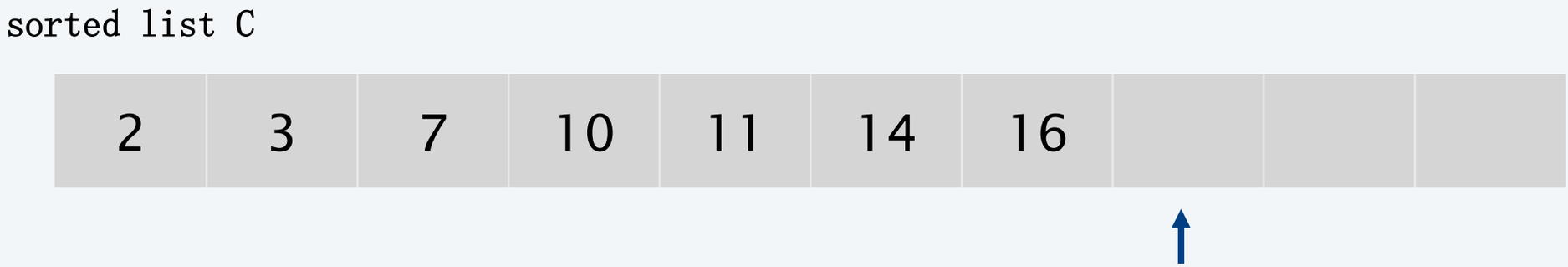
Merge and count demo

Given two sorted lists A and B,

- Count number of inversions (a, b) with $a \in A$ and $b \in B$.
- Merge A and B into sorted list C.



compare minimum entry in each list: copy 17 and add x to increment count



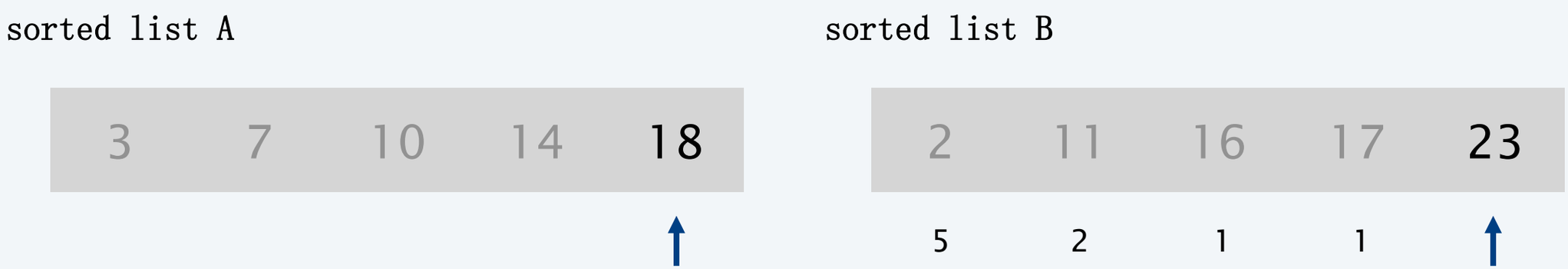
x = 1

inversions = 8

Merge and count demo

Given two sorted lists A and B,

- Count number of inversions (a, b) with $a \in A$ and $b \in B$.
- Merge A and B into sorted list C.



compare minimum entry in each list: copy 18 and decrement x

x = 1

inversions = 9

Merge and count demo

Given two sorted lists A and B,

- Count number of inversions (a, b) with $a \in A$ and $b \in B$.
- Merge A and B into sorted list C.

sorted list A

3	7	10	14	18

sorted list B

2	11	16	17	23
	5	2	1	1

list A exhausted: copy 23

sorted list C

2	3	7	10	11	14	16	17	18	

x = 0

inversions = 9

Merge and count demo

Given two sorted lists A and B,

- Count number of inversions (a, b) with $a \in A$ and $b \in B$.
- Merge A and B into sorted list C.

sorted list A

3	7	10	14	18

sorted list B

2	11	16	17	23

5 2 1 1 0

done: return 9 inversions

sorted list C

2	3	7	10	11	14	16	17	18	23

x = 0

inversions = 9