5. DIVIDE AND CONQUER I

‣ *merge and count demo*

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

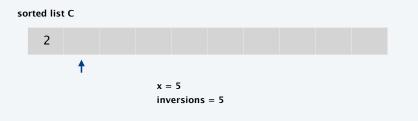|									

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.

sorted list A

3	7	10	14	18

sorted list B

2	11	16	17	23

5

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

sorted list C

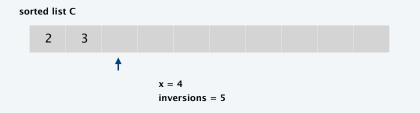| 2									

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.

sorted list A

3	7	10	14	18

sorted list B

5

2	11	16	17	23

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

sorted list C

2	3								

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.

sorted list A

3	7	10	14	18

sorted list B

5

2	11	16	17	23

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

sorted list C

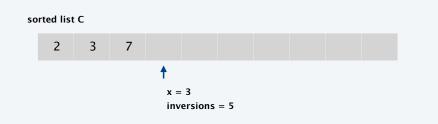| 2	3	7							

x = 3
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.

sorted list A

3	7	10	14	18

sorted list B

5

2	11	16	17	23

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

sorted list C

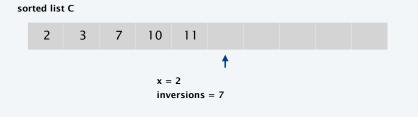| 2	3	7	10						

x = 2
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.

sorted list A

3	7	10	14	18

sorted list B

5   2

2	11	16	17	23

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

sorted list C

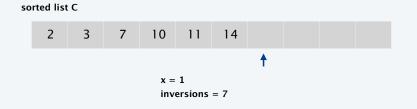| 2	3	7	10	11					

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 $b \in B$.
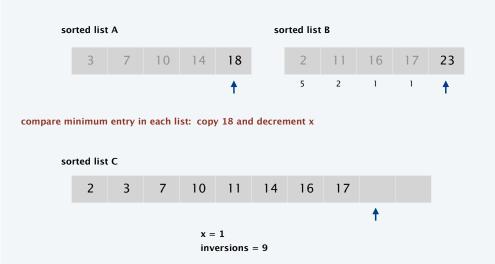- Merge A and B into sorted list C.

sorted list A

3	7	10	14	18

sorted list B

2	11	16	17	23

5   2   1

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

sorted list C

2	3	7	10	11	14	16			

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 $b \in B$.
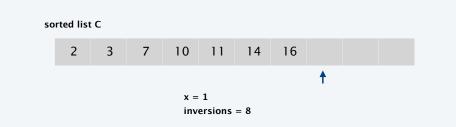- Merge A and B into sorted list C.

sorted list A

3	7	10	14	18

sorted list B

2	11	16	17	23

5   2   1   1

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

sorted list C

2	3	7	10	11	14	16	17		

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 $b \in B$.
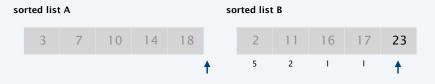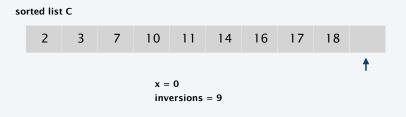- Merge A and B into sorted list C.

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 $b \in B$.
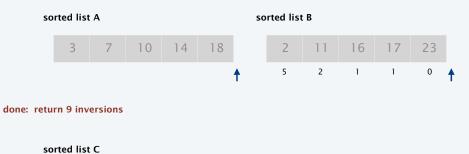- Merge A and B into sorted list C.

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