

Chapter 10

10.1 Use counting sort and sort the following items:

1, 3, 3, 4, 5, 2, 2

Solution:

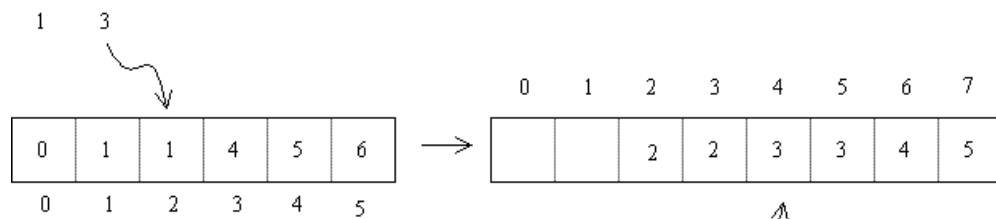
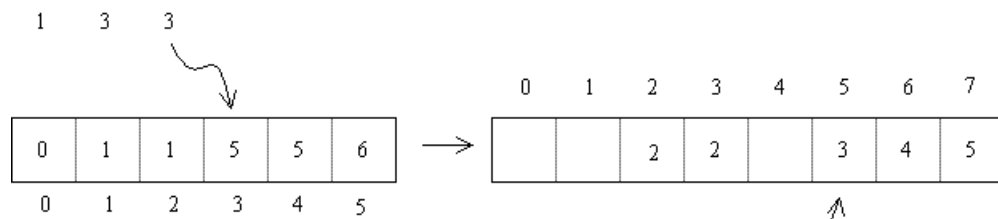
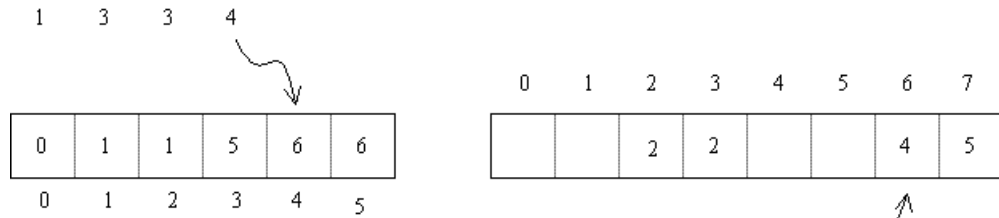
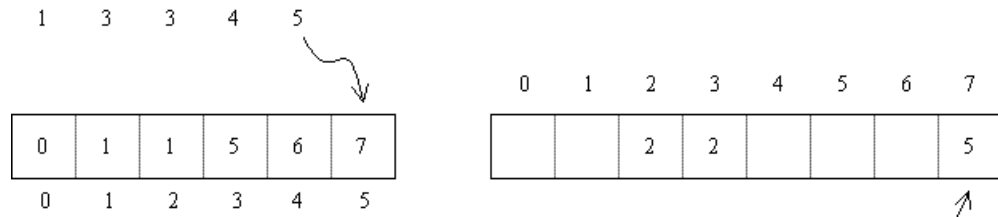
	0	1	2	3	4	5		0	1	2	3	4	5
Array C	0	0	0	0	0	0		0	1	1	2	1	1

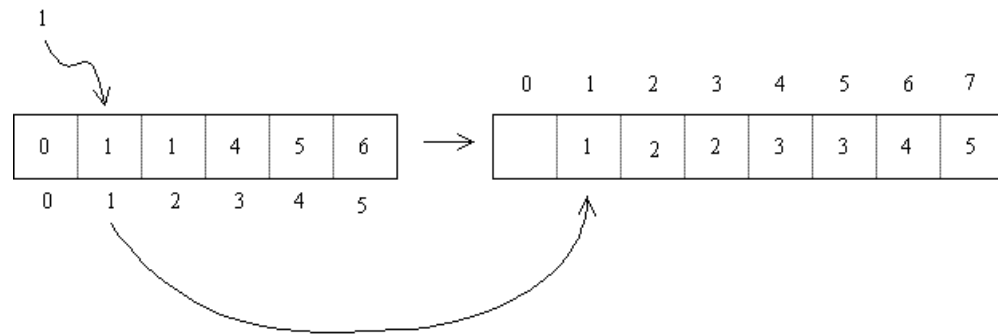
The cumulative frequency is given as

	0	1	2	3	4	5
	0	1	3	5	6	7

	1	3	3	4	5	2	2		0	1	2	3	4	5	6	7
Array A:									0	1	3	5	6	7		
												2				

	1	3	3	4	5	2			0	1	2	3	4	5	6	7
									0	1	2	5	6	7		
											2	2				





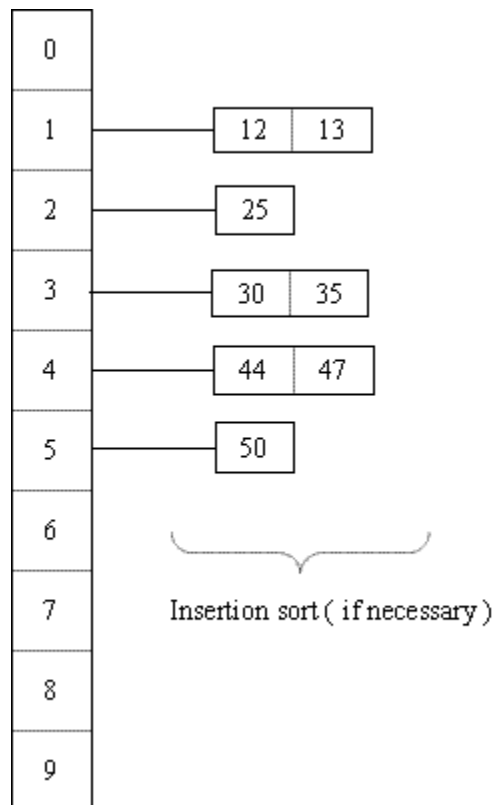
∴ The sorted list would be

1, 2, 2, 3, 3, 4, 5.

10.2 Use the bucket sort and sort the following items:

12, 13, 25, 30, 38, 44, 47, 50.

Solution:

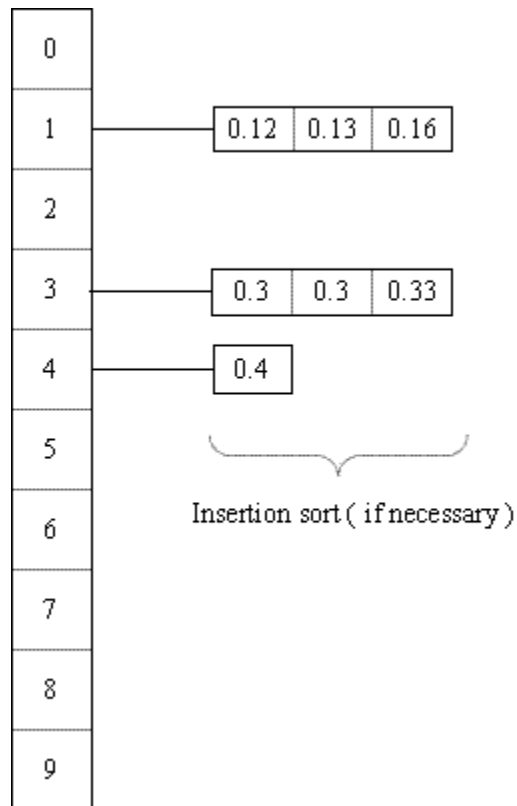


The distribution of numbers would be as shown above. The collection of the numbers would yield a sorted list.

10.3 Use bucket sort and sort the following items :

0.12, 0.13, 0.3, 0.16, 0.33, 0.3, 0.4

Solution:



The distribution of numbers is shown above.

The collection of numbers yields a sorted list.

10.4 Use radix sort and sort the following items :

312, 345, 516, 234, 122, 456, 199

Initial bucket position

Index	Elements
0	
1	
2	312,122
3	
4	234
5	345
6	516,456
7	

8	
9	199

Distribution of numbers based on the last digit

Collect all the numbers.

Index	Elements
0	
1	312,516
2	122
3	234
4	345
5	456
6	
7	
8	
9	199

312, 122, 234, 345, 516, 456, 199

Distribute based on the middle numbers

Collect all the numbers

Index	Elements
0	
1	122, 199
2	234
3	312,345
4	456
5	516
6	
7	
8	
9	

312, 516, 122, 234, 345, 456, 199

Distribute the numbers based on the 1st digit

Collect the sorted numbers.

122, 199, 234, 312, 345, 456, 516

10.5 Design a hash function for the following set of keys :

1234, 1356, 1788, 1999, 178, 781

Assume $m = 11$

$\therefore$ Hash code = key *mod* 11

$$1234 \bmod 11 = 2$$

$$1356 \bmod 11 = 3$$

$$1788 \bmod 11 = 6$$

$$1999 \bmod 11 = 8$$

$$178 \bmod 11 = 2$$

$$781 \bmod 11 = 0$$

10.6 Assuming that a hash table has 11 items, use a simple function $\text{hash}(\text{key}) = \text{key} \bmod 11$ and map the following keys :

a) 12, 56, 78, 67, 99, 28, 97

b) Is there any collision?

Solution :

$$12 \bmod 11 = 1$$

$$56 \bmod 11 = 1$$

$$78 \bmod 11 = 1$$

$$67 \bmod 11 = 1$$

$$99 \bmod 11 = 0$$

$$78 \bmod 11 = 1$$

$$97 \bmod 11 = 9$$

It can be observed that many keys such as 12, 56, 78, 67, and 78 are having collision.

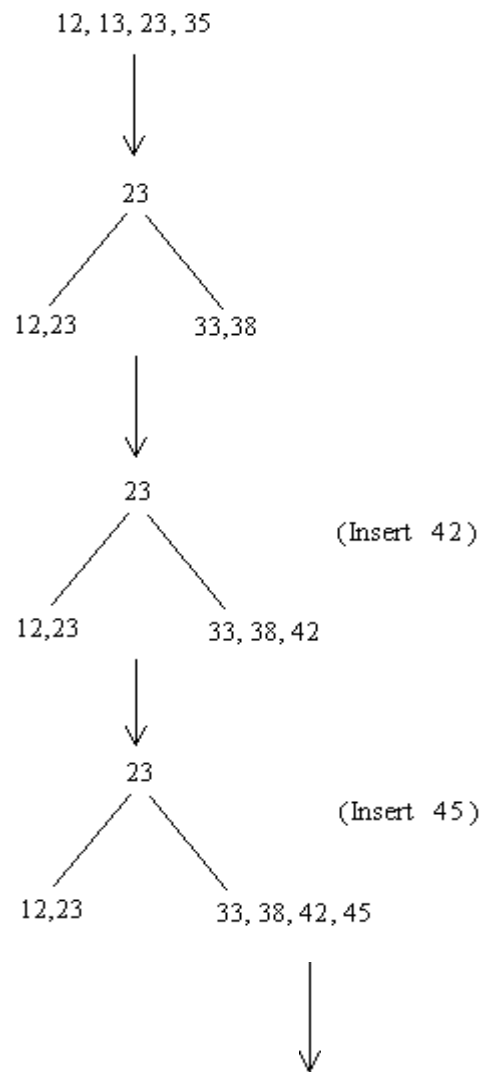
10.7 Use B-tree with $T=2$ and insert the following keys

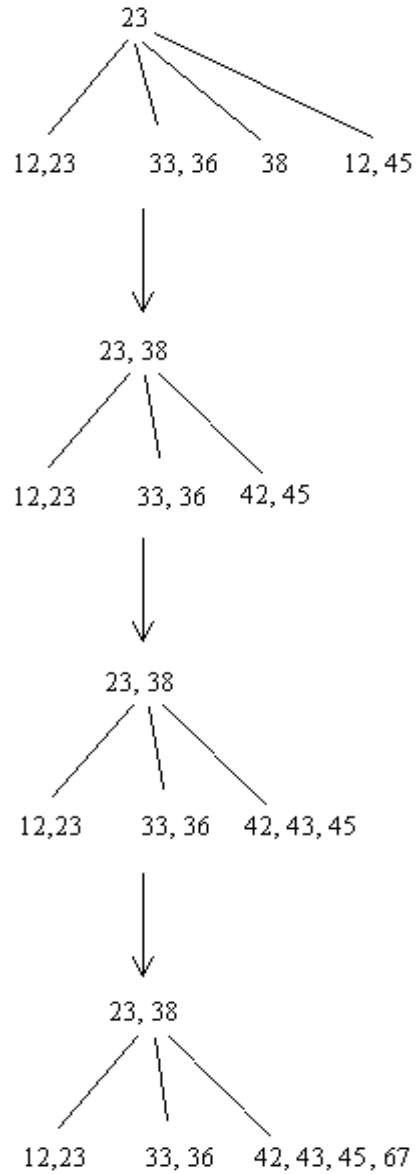
12, 13, 23, 33, 38, 42, 45, 36, 43, 67

Solution:

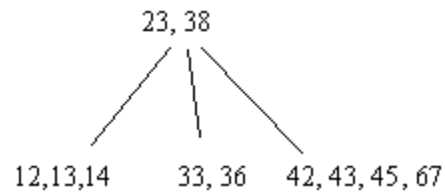
This would become like

12, 13, 23, 33, 38

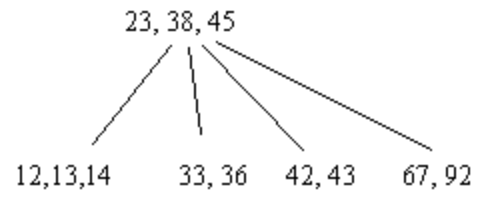




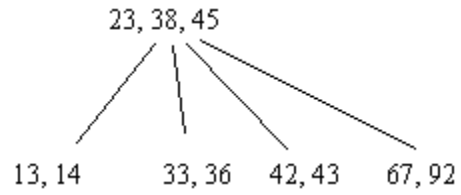
b) Insert key 14



c)



d) After deleting key 12



e) After deleting key 67