Assignment #7

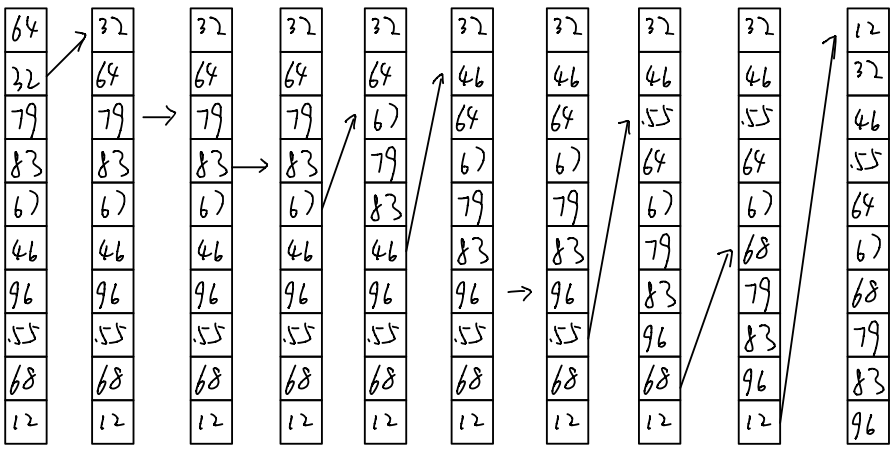
1) For the list shown below, illustrate each of following sorts as shown in the slide(s) listed:

64, 32, 79, 83, 67, 46, 96, 55, 68, 12

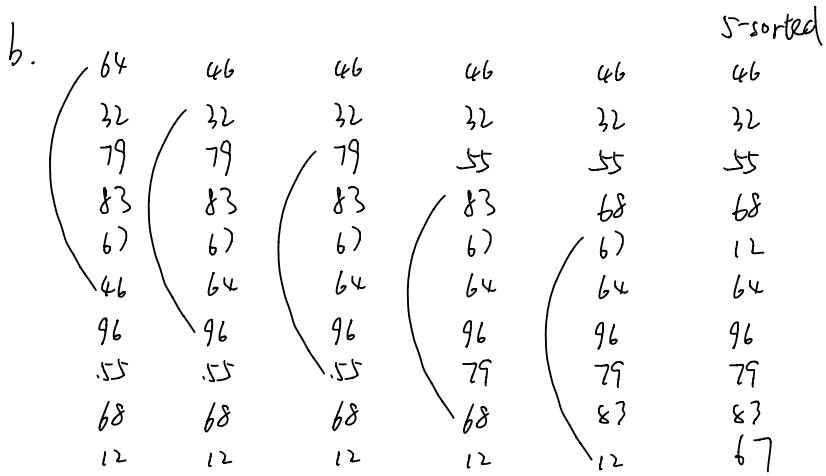
10 points: a) Insertion sort (slide 5)
15 points: b) Shell sort with sequence 5,3,1 (slides 14, 15, 16)
10 points: c) Merge sort (as slide 30)
10 points: d) Radix sort (as slide 59).

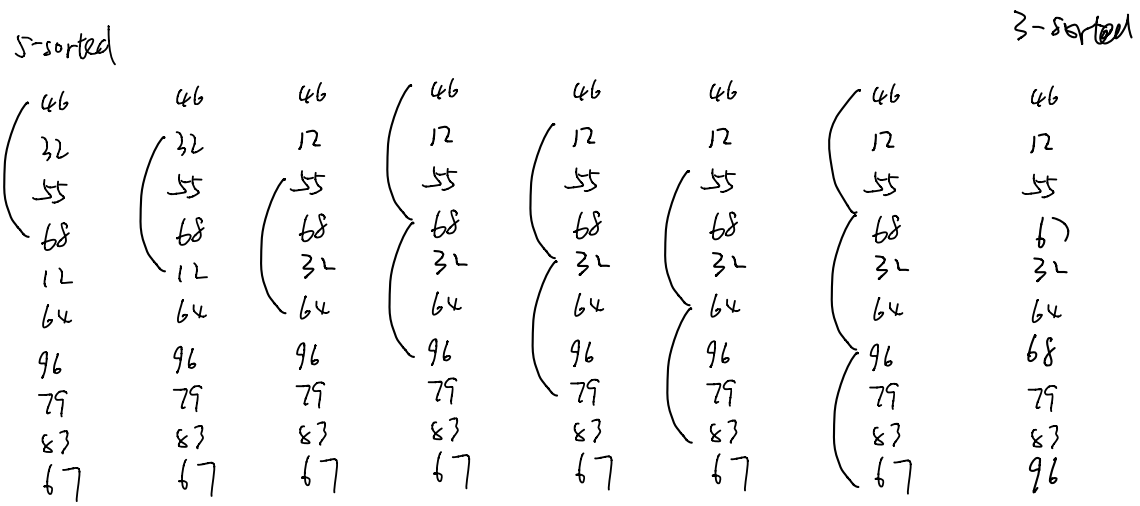
Note: continue each until the final list is sorted!

a.



b.





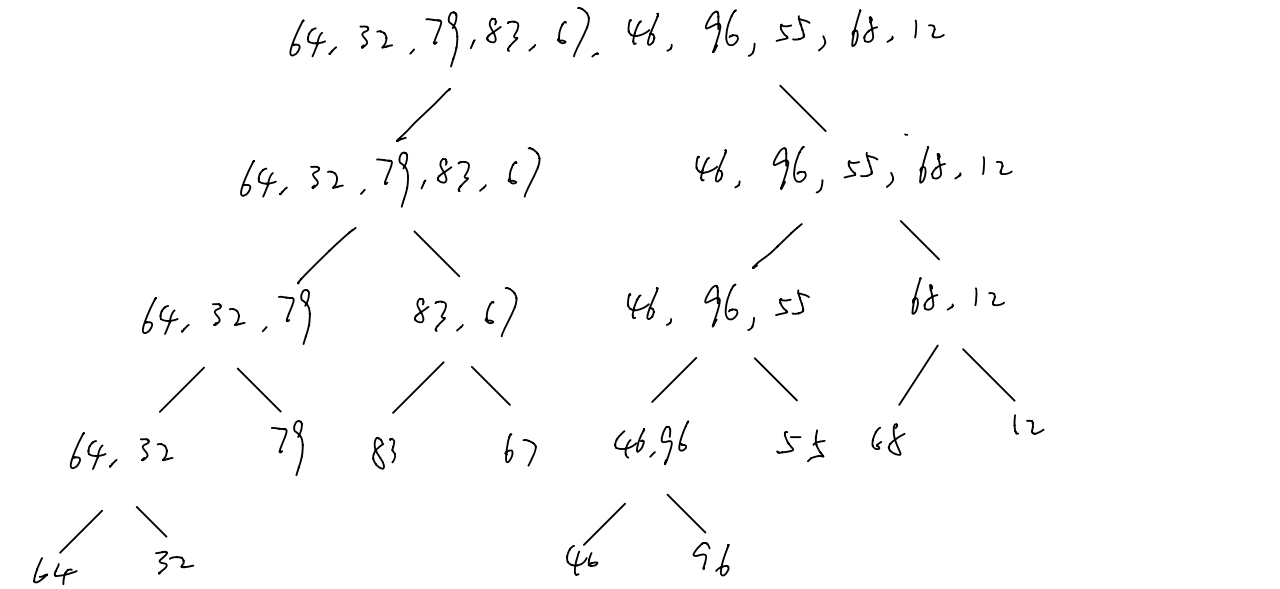
3-sorted

46	12	12	12	12	12	12	12	12	12
12	46	46	46	32	32	32	32	32	32
55	55	55	55	46	46	46	46	46	46
67	67	67	67	55	55	55	55	55	55
32	32	32	32	64	64	64	64	64	64
64	64	64	64	68	67	67	67	67	67
68	68	68	68	79	68	68	68	68	68
79	79	79	79	83	79	79	79	79	79
83	83	83	83	96	96	96	83	83	83
96	96	96	96				96	96	96

1-sorted

12, 32, 46, 55, 64, 67, 68, 79, 83, 96

c.



32, 64

46, 96

32, 64, 79

67, 83

46, 55, 96

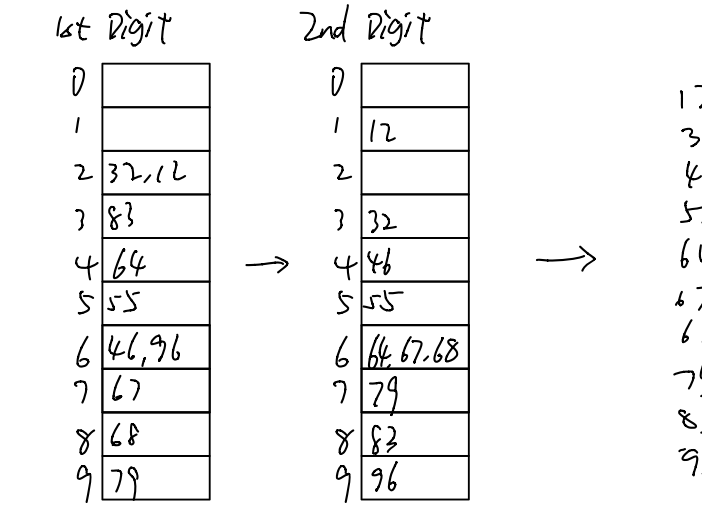
12, 68

32, 64, 67, 79, 83

12, 46, 55, 68, 96

12, 32, 46, 55, 64, 67, 68, 79, 83, 96

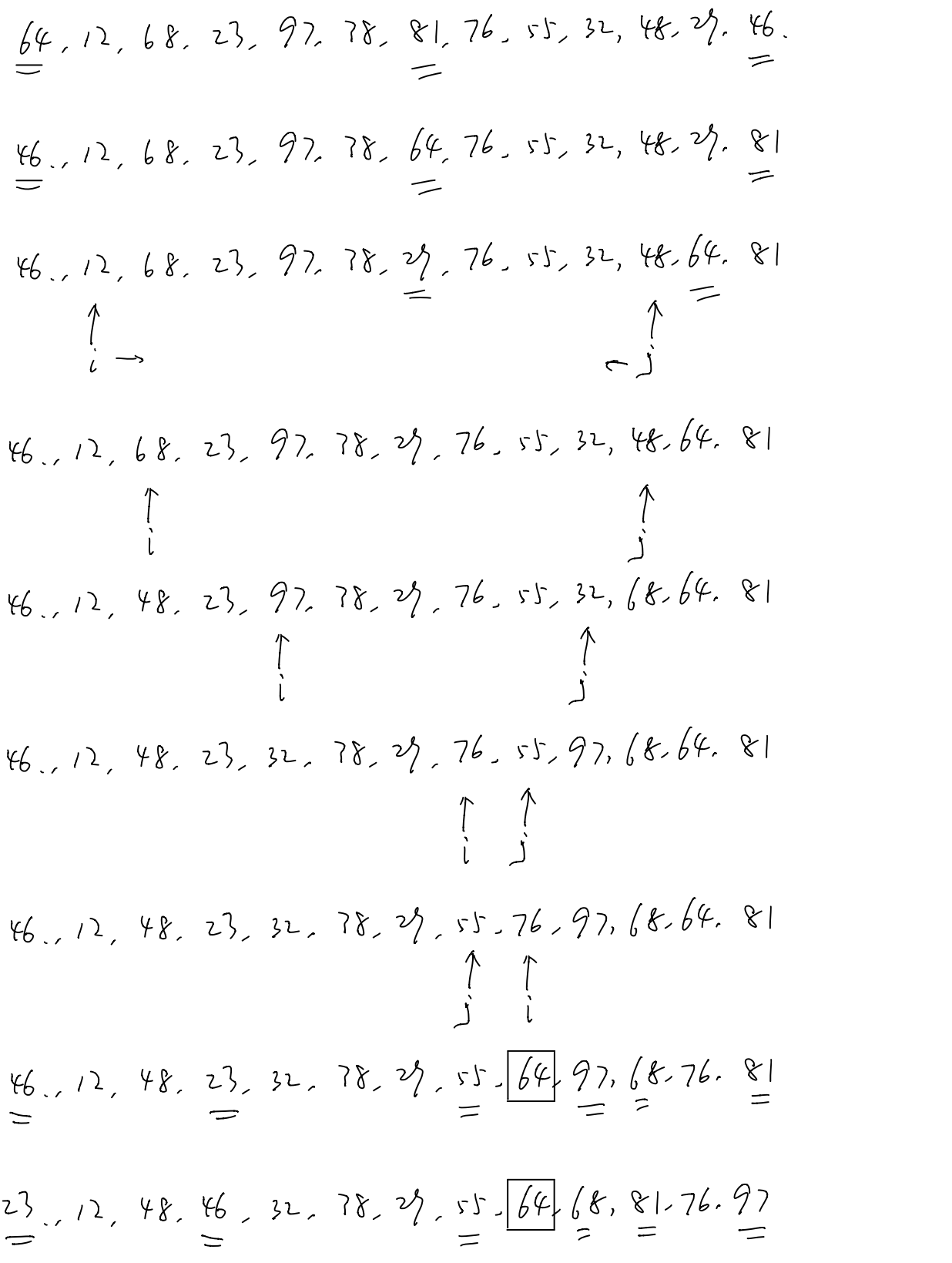
d.

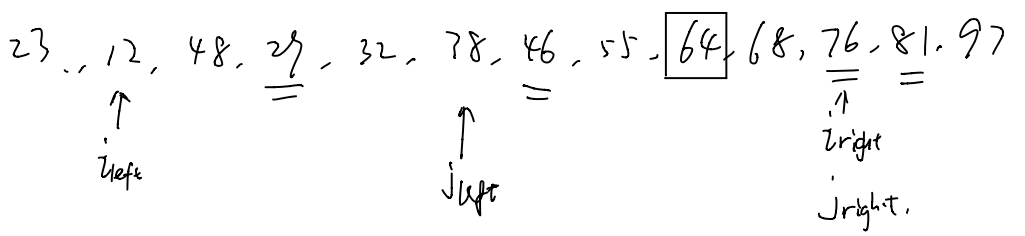


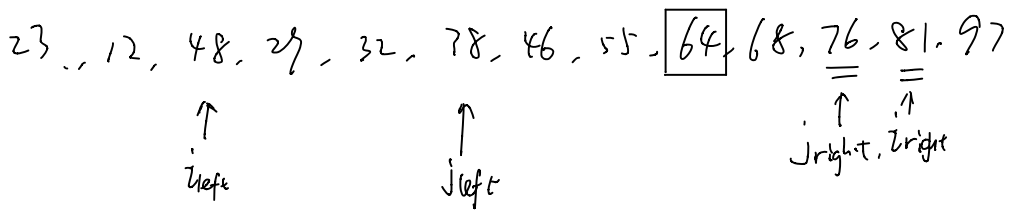
15 points
2) For the list shown below, demonstrate the following sort:
64, 12, 68, 23, 97, 38, 81, 76, 55, 32, 48, 29, 46

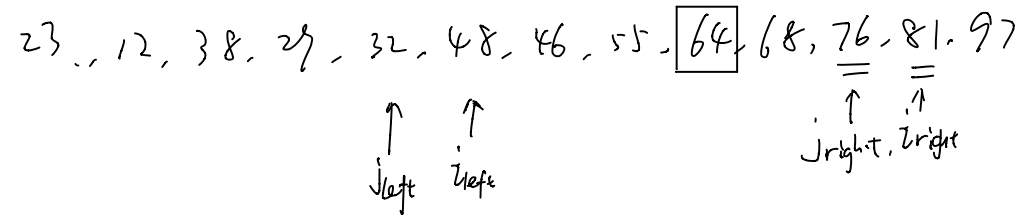
Quick sort (as slide 45). Use median-of-three and continue until the list is sorted. If a partition size is <= 3, just put the partition in sorted order.

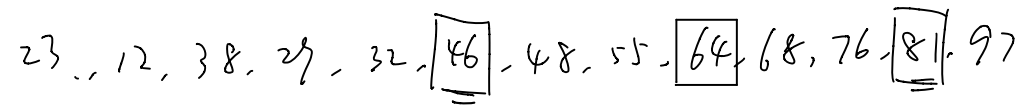
□ means fixed item

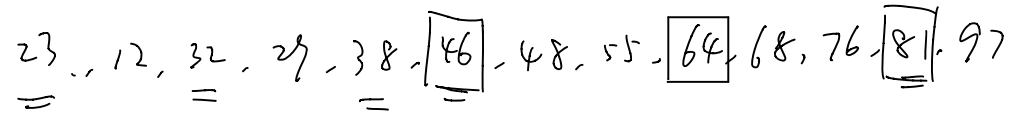


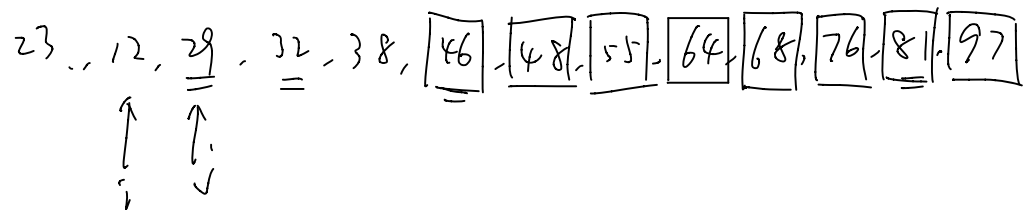

23, 12, 48, 29, 32, 78, 46, 55, 64, 68, 76, 81, 97
i left
j left
i right
j right.

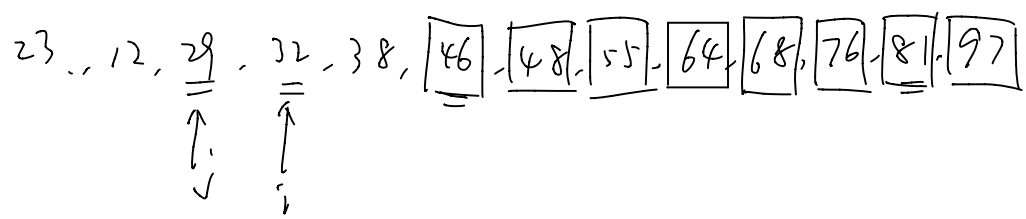

23, 12, 48, 29, 32, 78, 46, 55, 64, 68, 76, 81, 97
i left
j left
j right, i right

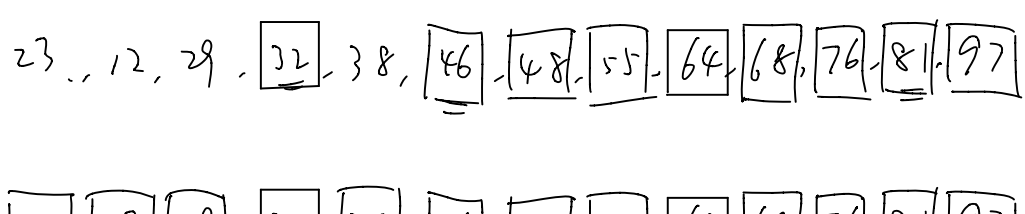

23, 12, 38, 29, 32, 48, 46, 55, 64, 68, 76, 81, 97
j left
i left
j right, i right

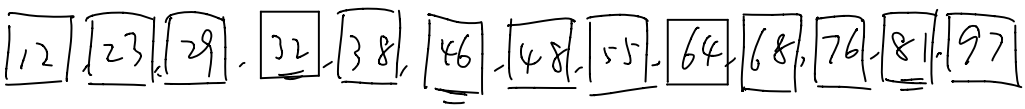

23, 12, 38, 29, 32, 46, 48, 55, 64, 68, 76, 81, 97


23, 12, 32, 29, 38, 46, 48, 55, 64, 68, 76, 81, 97

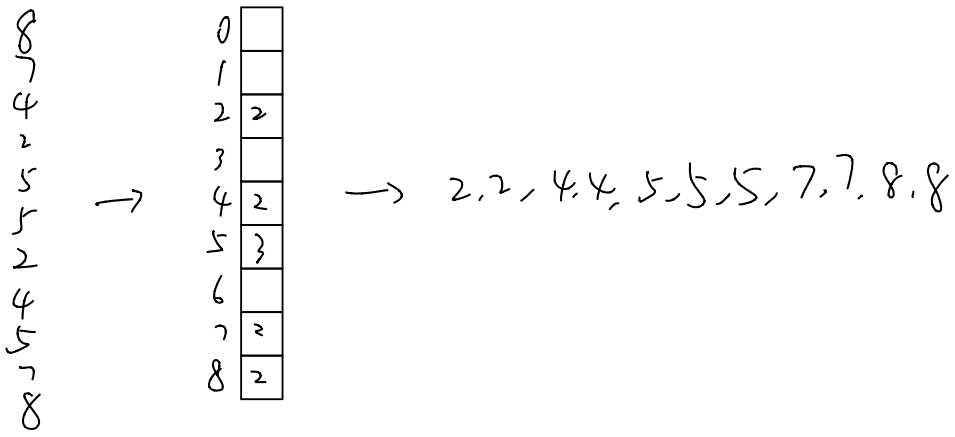

23, 12, 29, 32, 38, 46, 48, 55, 64, 68, 76, 81, 97


23, 12, 29, 32, 38, 46, 48, 55, 64, 68, 76, 81, 97


23, 12, 29, 32, 38, 46, 48, 55, 64, 68, 76, 81, 97

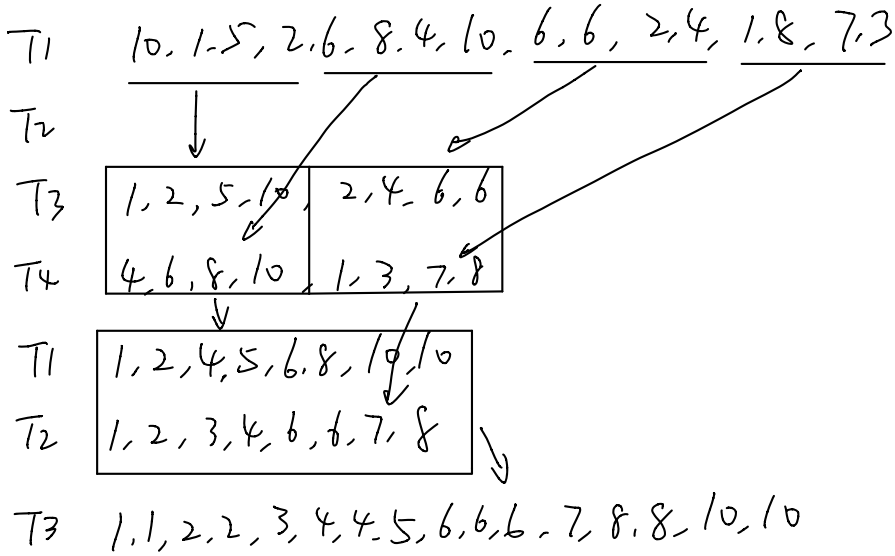

12, 23, 29, 32, 38, 46, 48, 55, 64, 68, 76, 81, 97

10 points
3) For the list shown below, demonstrate the following sort:
8, 7, 4, 2, 5, 5, 2, 4, 5, 7, 8
Bucket sort (as slide 57).



10 points
4) For the list shown below, demonstrate the following sort:
10, 1, 5, 2, 6, 8, 4, 10, 6, 6, 2, 4, 1, 8, 7, 3
External sort (as slide 61). Use a run size of 4.

Note: continue until the final list is sorted!



10 points
5) For the list below, what runs would be created if M=3 using replacement selection?

10, 1, 5, 2, 6, 8, 4, 10, 6, 6, 2, 4, 1, 8, 7

Run 1 : 1, 2, 5, 6, 8, 10, 10

Run 2 : 4, 6, 6

Run 3 : 1, 2, 4, 7, 8

10 points
6) Suppose 4 items are to be compared. How many leaves would the decision tree have for this number of items? How many comparisons at worst would it take to sort them?

$4! = 4 \times 3 \times 2 \times 1 = 24$ leaves.

$\lceil \log 24 \rceil = 5$ comparisons at worst case.