

Q1)

a)

	64	32	32	32	32	32	32	32	32	12		
0	64	32	64	64	64	46	46	46	46	32		
1	32	64	79	79	79	67	64	64	55	46		
2	79	79	83	83	83	67	67	67	64	55		
3	83	83	67	67	67	83	79	79	67	64		
4	67	67	46	46	46	83	83	79	68	67		
5	46	46	96	96	96	96	96	83	79	68		
6	96	96	55	55	55	55	55	96	83	79		
7	55	55	68	68	68	68	68	68	96	83		
8	68	68	12	12	12	12	12	12	12	96		
9	12	12										

b)

i) 5 sorting

original

sorted.

	64	46	46	46	46	46						
	64	46	46	46	46	46						
	32	32	32	32	32	32						
	79	79	79	55	55	55						
	83	83	83	68	68	68						
	67	67	67	67	67	12						
	46	64	64	64	64	164						
	96	96	96	96	96	96						
	55	55	55	79	79	79						
	68	68	68	68	83	83						
	12	12	12	12	12	67						

ii) Sorted

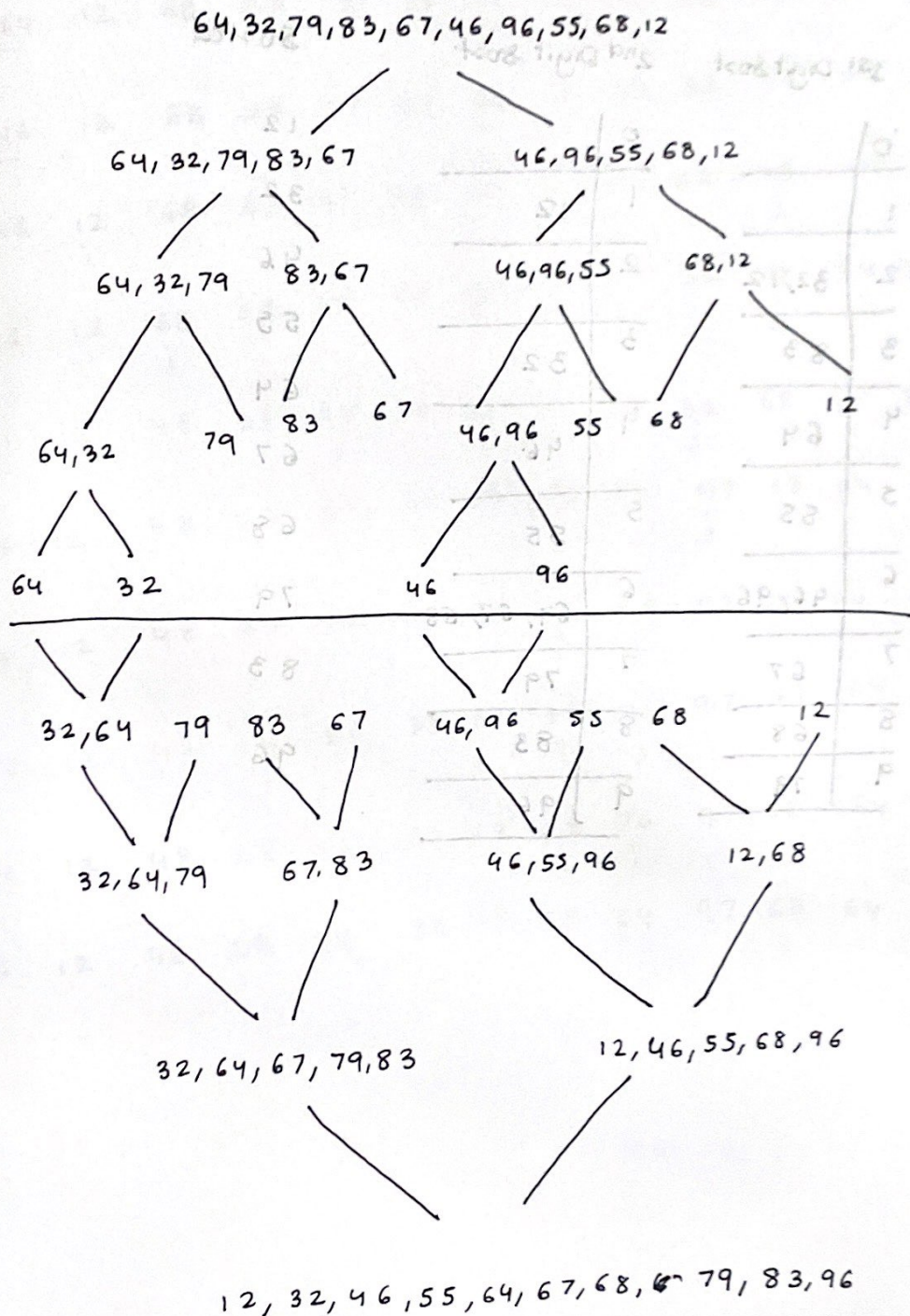
3-rooted.

iii) 1 sorting.

Sorted

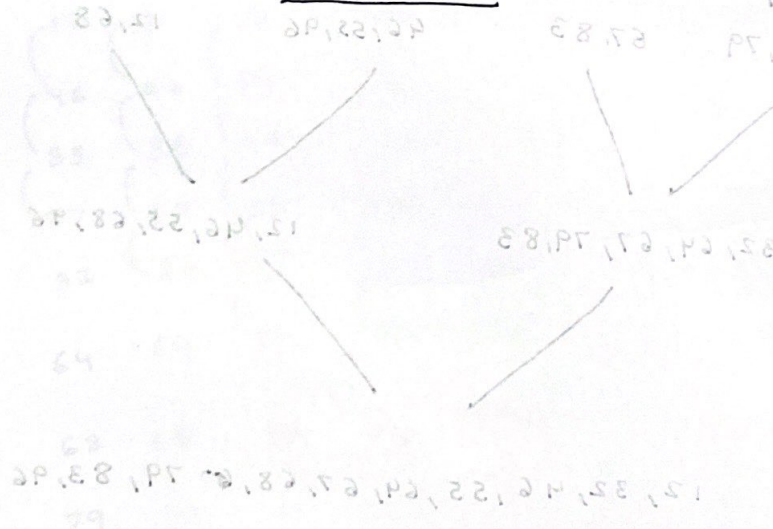
[illegible]

c) Merge sort



d) Radix sort

Original	1st Digit sort	2nd Digit sort	Sorted
64	0	0	12
32	1	1	32
79	2	2	46
83	3	3	55
67	4	4	64
46	5	5	67
96	6	6	68
55	7	7	79
68	8	8	83
12	9	9	96



Q2)

Step 1:-

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

Step 2:

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

Step 3:

23 12 38 29 32 38 46 55 68 76 81 97
 23 12 32 29 38
 23 12 29 32 38
 list size ≤ 3
 12 23 29

Result:

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

Q3)

8
7
4
2
5
5
2
4
5
7
8

0	
1	
2	2
3	
4	2
5	3
6	
7	2
8	2
9	

(8 obtained) process

sorted

2
2
4
4
5
5
5
7
7
8
8

input

Q4)

T1 10 1 5 2 6 8 4 10 6 6 2 4 1 8 7 3

T2

T3 1 2 5 10 2 4 6 6

T4 4 6 8 10 1 3 7 8

T1 1 2 4 5 6 8 10 10

T2 1 2 3 4 6 6 7 8

T3 1 1 2 2 3 4 4 5 6 6 6 7 8 8 10 10

Q5

Input

Memory (holds 3)

Output
Run 1

2.7)

10	10	1	5	10 + 1 = 11	11	2
1	10	2	5	10 + 2 = 12	12	5
5	10	6	5	10 + 6 = 16	16	8
2	10	6	8			10
6	10	4*	8			10
8	10	4*	10			
4	6*	4*	10			Run 2
10	6*	4*	6*			4
6	6	2*	6			6
6	4*	2*	6			6
2	4*	2*	1*			Run 3
4	4	2	8			1
1	4	7	8			2
8		7	8			4
7			8			7
						8

Q 6

4 items in list = 4! arrangements.

∴ depth = $\log_2(4!)$ depth

* $\lceil \log_2(4!) \rceil = 5$ comparison

Depth

(# elements) parallel

Level 1

Level 2

Level 3

Depth

Level 1

Level 2

Level 3

Level 4

Level 5

Level 6

8

01

01

4

2

2

1

2

4

7

8

8

2

10

01

2

2

2

4

8

8

8

8

2

2

4

10

01

2

2

4

4

7

7

7

7

01

01

10

01

01

01

4

2

2

4

4

7

7

7

7

01

2

2

2

2

8

4

10

2

2

2

7

7

8

7