**Homework lecture 1**

**Sort**

1. Given a list of integer numbers: 2, 1, 10, 6, 3, 8, 7, 13, 20. Draw the steps to sort (ascending sort) the list by following methods:

* Selection sort

2, 1, 10, 6, 3, 8, 7, 13, 20

1 2 10 6 3 8 7 13 20

1 2 10 6 3 8 7 13 20

1 2 3 6 10 8 7 13 20

1 2 3 6 10 8 7 13 20

1 2 3 6 7 8 10 13 20

1 2 3 6 7 8 10 13 20

1 2 3 6 7 8 10 13 20

1 2 3 6 7 8 10 13 20

1 2 3 6 7 8 10 13 20

* Insertion sort

2, 1, 10, 6, 3, 8, 7, 13, 20

1 2 10 6 3 8 7 13 20

1 2 10 6 3 8 7 13 20

1 2 6 10 3 8 7 13 20

1 2 3 6 10 8 7 13 20

1 2 3 6 8 10 7 13 20

1 2 3 6 7 8 10 13 20

1 2 3 6 7 8 10 13 20

1 2 3 6 7 8 10 13 20

* Bubble sort

2, 1, 10, 6, 3, 8, 7, 13, 20

1 2 10 6 3 8 7 13 20

1 2 6 10 3 8 7 13 20

1 2 6 3 10 8 7 13 20

1 2 6 3 8 10 7 13 20

1 2 6 3 8 7 10 13 20

1 2 3 6 8 7 10 13 20

1 2 3 6 7 8 10 13 20

* Merge sort

2, 1, 10, 6, 3, 8, 7, 13, 20

1 2 10 6 3 8 7 13 20

1 2 10 6 3 8 7 13 20

1 2 10 3 6 8 7 13 20

1 2 3 6 10 8 7 13 20

1 2 3 6 10 7 8 13 20

1 2 3 6 10 7 8 13 20

1 2 3 6 10 7 8 13 20

1 2 3 6 7 8 10 13 20

* Quick sort

2, 1, 10, 6, 3, 8, 7, 13, 20

2 1 10 6 3 8 7 13 20

2 1 10 6 3 8 7 13 20

2 1 6 3 7 8 10 13 20

2 1 3 6 7 8 10 13 20

1 2 3 6 7 8 10 13 20

1 2 3 6 7 8 10 13 20

1. Same question for these lists:

* **1, 2, 3, 4, 5, 6, 7, 8, 9, 10**
  + - * Selection sort

Step 1: 1 2 3 4 5 6 7 8 9 10

Step 2: 1 2 3 4 5 6 7 8 9 10

Step 3: 1 2 3 4 5 6 7 8 9 10

Step 4: 1 2 3 4 5 6 7 8 9 10

Step 5: 1 2 3 4 5 6 7 8 9 10

Step 6: 1 2 3 4 5 6 7 8 9 10

Step 7: 1 2 3 4 5 6 7 8 9 10

Step 8: 1 2 3 4 5 6 7 8 9 10

Step 9: 1 2 3 4 5 6 7 8 9 10

* + - * Insertion sort

Step 1: 1 2 3 4 5 6 7 8 9 10

Step 2: 1 2 3 4 5 6 7 8 9 10

Step 3: 1 2 3 4 5 6 7 8 9 10

Step 4: 1 2 3 4 5 6 7 8 9 10

Step 5: 1 2 3 4 5 6 7 8 9 10

Step 6: 1 2 3 4 5 6 7 8 9 10

Step 7: 1 2 3 4 5 6 7 8 9 10

Step 8: 1 2 3 4 5 6 7 8 9 10

Step 9: 1 2 3 4 5 6 7 8 9 10

* + - * Buble sort

1 2 3 4 5 6 7 8 9 10

1 2 3 4 5 6 7 8 9 10

1 2 3 4 5 6 7 8 9 10

1 2 3 4 5 6 7 8 9 10

1 2 3 4 5 6 7 8 9 10

1 2 3 4 5 6 7 8 9 10

1 2 3 4 5 6 7 8 9 10

1 2 3 4 5 6 7 8 9 10

1 2 3 4 5 6 7 8 9 10

* + - * Merge sort

1 2 3 4 5 6 7 8 9 10

1 2 3 4 5 6 7 8 9 10

1 2 3 4 5 6 7 8 9 10

1 2 3 4 5 6 7 8 9 10

1 2 3 4 5 6 7 8 9 10

1 2 3 4 5 6 7 8 9 10

1 2 3 4 5 6 7 8 9 10

1 2 3 4 5 6 7 8 9 10

1 2 3 4 5 6 7 8 9 10

* + - * Quick sort

1 2 3 4 5 6 7 8 9 10

1 2 3 4 5 6 7 8 9 10

1 2 3 4 5 6 7 8 9 10

1 2 3 4 5 6 7 8 9 10

1 2 3 4 5 6 7 8 9 10

1 2 3 4 5 6 7 8 9 10

1 2 3 4 5 6 7 8 9 10

1 2 3 4 5 6 7 8 9 10

1 2 3 4 5 6 7 8 9 10

1 2 3 4 5 6 7 8 9 10

* **10, 9, 8, 7, 6, 5, 4, 3, 2, 1**

**• Selection sort**10, 9, 8, 7, 6, 5, 4, 3, 2, 1

1 9 8 7 6 5 4 3 2 10

1 2 8 7 6 5 4 3 9 10

1 2 3 7 6 5 4 8 9 10

1 2 3 4 6 5 7 8 9 10

1 2 3 4 5 6 7 8 9 10

• **Insertion sort**

10, 9, 8, 7, 6, 5, 4, 3, 2, 1

9 10 8 7 6 5 4 3 2 1

8 9 10 7 6 5 4 3 2 1

7 8 9 10 6 5 4 3 2 1

6 7 8 9 10 5 4 3 2 1

5 6 7 8 9 10 4 3 2 1

4 5 6 7 8 9 10 3 2 1

3 4 5 6 7 8 9 10 2 1

2 3 4 5 6 7 8 9 10 1

1 2 3 4 5 6 7 8 9 10

• Buble sort

10, 9, 8, 7, 6, 5, 4, 3, 2, 1

9 10 8 7 6 5 4 3 2 1

9 8 10 7 6 5 4 3 2 1

9 8 7 10 6 5 4 3 2 1

9 8 7 6 10 5 4 3 2 1

9 8 7 6 5 10 4 3 2 1

9 8 7 6 5 4 10 3 2 1

9 8 7 6 5 4 3 10 2 1

9 8 7 6 5 4 3 2 10 1

9 8 7 6 5 4 3 2 1 10

8 9 7 6 5 4 3 2 1 10

8 7 9 6 5 4 3 2 1 10

8 7 6 9 5 4 3 2 1 10

8 7 6 5 9 4 3 2 1 10

8 7 6 5 4 9 3 2 1 10

8 7 6 5 4 3 9 2 1 10

8 7 6 5 4 3 2 9 1 10

8 7 6 5 4 3 2 1 9 10

7 8 6 5 4 3 2 1 9 10

7 6 8 5 4 3 2 1 9 10

7 6 5 8 4 3 2 1 9 10

7 6 5 4 8 3 2 1 9 10

7 6 5 4 3 8 2 1 9 10

7 6 5 4 3 2 8 1 9 10

7 6 5 4 3 2 1 8 9 10

6 7 5 4 3 2 1 8 9 10

6 5 7 4 3 2 1 8 9 10

6 5 4 7 3 2 1 8 9 10

6 5 4 3 7 2 1 8 9 10

6 5 4 3 2 7 1 8 9 10

6 5 4 3 2 1 7 8 9 10

5 6 4 3 2 1 7 8 9 10

5 4 6 3 2 1 7 8 9 10

5 4 3 6 2 1 7 8 9 10

5 4 3 2 6 1 7 8 9 10

5 4 3 2 1 6 7 8 9 10

4 5 3 2 1 6 7 8 9 10

4 3 5 2 1 6 7 8 9 10

4 3 2 5 1 6 7 8 9 10

4 3 2 1 5 6 7 8 9 10

3 4 2 1 5 6 7 8 9 10

3 2 4 1 5 6 7 8 9 10

3 2 1 4 5 6 7 8 9 10

2 3 1 4 5 6 7 8 9 10

2 1 3 4 5 6 7 8 9 10

1 2 3 4 5 6 7 8 9 10

• Merge sort

10, 9, 8, 7, 6, 5, 4, 3, 2, 1

9 10 8 7 6 5 4 3 2 1

8 9 10 7 6 5 4 3 2 1

8 9 10 6 7 5 4 3 2 1

6 7 8 9 10 5 4 3 2 1

6 7 8 9 10 4 5 3 2 1

6 7 8 9 10 3 4 5 2 1

6 7 8 9 10 3 4 5 1 2

6 7 8 9 10 1 2 3 4 5

1 2 3 4 5 6 7 8 9 10

• Quick sort

10, 9, 8, 7, 6, 5, 4, 3, 2, 1

1 10 9 8 7 6 5 4 3 2

1 2 10 9 8 7 6 5 4 3

1 2 3 10 9 8 7 6 5 4

1 2 3 4 10 9 8 7 6 5

1 2 3 4 5 10 9 8 7 6

1 2 3 4 5 6 10 9 8 7

1 2 3 4 5 6 7 10 9 8

1 2 3 4 5 6 7 8 10 9

1 2 3 4 5 6 7 8 9 10

* **9, 10, 1, 2, 3, 4, 5, 6, 7, 8**

• Selection sort

9, 10, 1, 2, 3, 4, 5, 6, 7, 8

1 10 9 2 3 4 5 6 7 8

1 2 9 10 3 4 5 6 7 8

1 2 3 10 9 4 5 6 7 8

1 2 3 4 9 10 5 6 7 8

1 2 3 4 5 10 9 6 7 8

1 2 3 4 5 6 9 10 7 8

1 2 3 4 5 6 7 10 9 8

1 2 3 4 5 6 7 8 9 10

1 2 3 4 5 6 7 8 9 10

1 2 3 4 5 6 7 8 9 10

• Insertion sort

9, 10, 1, 2, 3, 4, 5, 6, 7, 8

1 9 10 2 3 4 5 6 7 8

1 2 9 10 3 4 5 6 7 8

1 2 3 9 10 4 5 6 7 8

1 2 3 4 9 10 5 6 7 8

1 2 3 4 5 9 10 6 7 8

1 2 3 4 5 6 9 10 7 8

1 2 3 4 5 6 7 9 10 8

1 2 3 4 5 6 7 8 9 10

• Buble sort

9, 10, 1, 2, 3, 4, 5, 6, 7, 8

9 10 1 2 3 4 5 6 7 8

9 1 10 2 3 4 5 6 7 8

9 1 2 10 3 4 5 6 7 8

9 1 2 3 10 4 5 6 7 8

9 1 2 3 4 10 5 6 7 8

9 1 2 3 4 5 10 6 7 8

9 1 2 3 4 5 6 10 7 8

9 1 2 3 4 5 6 7 10 8

9 1 2 3 4 5 6 7 8 10

1 9 2 3 4 5 6 7 8 10

1 2 9 3 4 5 6 7 8 10

1 2 3 9 4 5 6 7 8 10

1 2 3 4 9 5 6 7 8 10

1 2 3 4 5 9 6 7 8 10

1 2 3 4 5 6 9 7 8 10

1 2 3 4 5 6 7 9 8 10

1 2 3 4 5 6 7 8 9 10

• Merge sort

9, 10, 1, 2, 3, 4, 5, 6, 7, 8

9 10 1 2 3 4 5 6 7 8

1 9 10 2 3 4 5 6 7 8

1 9 10 2 3 4 5 6 7 8

1 2 3 9 10 4 5 6 7 8

1 2 3 9 10 4 5 6 7 8

1 2 3 9 10 4 5 6 7 8

1 2 3 9 10 4 5 6 7 8

1 2 3 9 10 4 5 6 7 8

1 2 3 4 5 6 7 8 9 10

• Quick sort

9, 10, 1, 2, 3, 4, 5, 6, 7, 8

1 2 3 4 5 6 7 8 9 10

1 2 3 4 5 6 7 8 9 10

1 2 3 4 5 6 7 8 9 10

1 2 3 4 5 6 7 8 9 10

1 2 3 4 5 6 7 8 9 10

1 2 3 4 5 6 7 8 9 10

1 2 3 4 5 6 7 8 9 10

1 2 3 4 5 6 7 8 9 10

* 3, 4, 5, 6, 7, 8, 9, 10, 1, 2

• Selection sort

3, 4, 5, 6, 7, 8, 9, 10, 1, 2

Step 1: 1 4 5 6 7 8 9 10 3 2

Step 2: 1 2 5 6 7 8 9 10 3 4

Step 3: 1 2 3 6 7 8 9 10 5 4

Step 4: 1 2 3 4 7 8 9 10 5 6

Step 5: 1 2 3 4 5 8 9 10 7 6

Step 6: 1 2 3 4 5 6 9 10 7 8

Step 7: 1 2 3 4 5 6 7 10 9 8

Step 8: 1 2 3 4 5 6 7 8 9 10

Step 9: 1 2 3 4 5 6 7 8 9 10

• Insertion sort

3, 4, 5, 6, 7, 8, 9, 10, 1, 2

3 4 5 6 7 8 9 10 1 2

3 4 5 6 7 8 9 10 1 2

3 4 5 6 7 8 9 10 1 2

3 4 5 6 7 8 9 10 1 2

3 4 5 6 7 8 9 10 1 2

3 4 5 6 7 8 9 10 1 2

3 4 5 6 7 8 9 10 1 2

1 3 4 5 6 7 8 9 10 2

1 2 3 4 5 6 7 8 9 10

• Bubble sort

3, 4, 5, 6, 7, 8, 9, 10, 1, 2

3 4 5 6 7 8 9 1 10 2

3 4 5 6 7 8 9 1 2 10

3 4 5 6 7 8 1 9 2 10

3 4 5 6 7 8 1 2 9 10

3 4 5 6 7 1 8 2 9 10

3 4 5 6 7 1 2 8 9 10

3 4 5 6 1 7 2 8 9 10

3 4 5 6 1 2 7 8 9 10

3 4 5 1 6 2 7 8 9 10

3 4 5 1 2 6 7 8 9 10

3 4 1 5 2 6 7 8 9 10

3 4 1 2 5 6 7 8 9 10

3 1 4 2 5 6 7 8 9 10

3 1 2 4 5 6 7 8 9 10

1 3 2 4 5 6 7 8 9 10

1 2 3 4 5 6 7 8 9 10

• Merge sort

3, 4, 5, 6, 7, 8, 9, 10, 1, 2

3 4 5 6 7 8 9 10 1 2

3 4 5 6 7 8 9 10 1 2

3 4 5 6 7 8 9 10 1 2

3 4 5 6 7 8 9 10 1 2

3 4 5 6 7 8 9 10 1 2

3 4 5 6 7 8 9 10 1 2

3 4 5 6 7 8 9 10 1 2

3 4 5 6 7 1 2 8 9 10

1 2 3 4 5 6 7 8 9 10

• Quick sort

3, 4, 5, 6, 7, 8, 9, 10, 1, 2

1 2 5 6 7 8 9 10 3 4

1 2 3 4 7 8 9 10 5 6

1 2 3 4 5 6 9 10 7 8

1 2 3 4 5 6 7 8 9 10

1 2 3 4 5 6 7 8 9 10

1 2 3 4 5 6 7 8 9 10

1. Write a program to sort (ascending sort) the list by following methods:

* Selection sort
* Insertion sort
* Bubble sort
* Merge sort
* Quick sort
* Heap sort
* Radix sort