Course: CSC 340.04

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Assignment Number: 05

Assignment Due Date & Time: 05-07-2021 at 11:55 PM

INSTRUCTION – Sorting, 30 points

Please come up with an array of 9 random integers then sort the array in 5 different ways.

Show the contents of the array each time a sorting algorithm changes it while sorting the array

into ascending order. The 6 sorting algorithms we are using are:

1. Selection Sort   *3 points*

```
7  2  5  9  6  2  1  4  9
1  2  5  9  6  2  7  4  9
   2  5  9  6  2  7  4  9
      2  9  6  5  7  4  9
         4  6  5  7  9  9
            5  6  7  9  9
               6  7  9  9
                         ↓
1  2  2  4  5  6  7  9  9
```

2. Insertion Sort   *3 points*

[7] 2 5 9 6 2 1 4 9
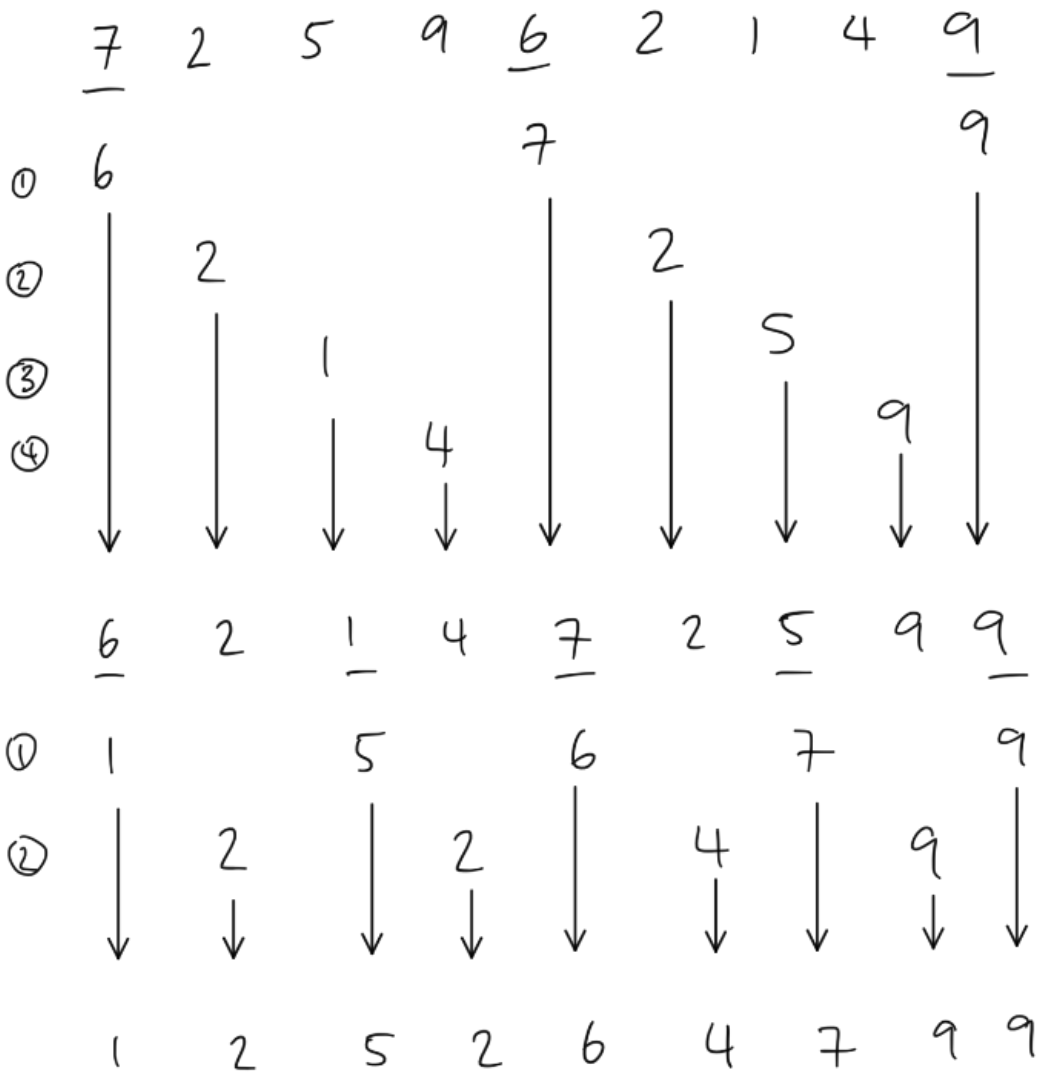
[7 2]

[2 7 5]

[2 5 7 9]

[2 5 7 9 6]

[2 5 6 7 9 2]

[2 2 5 6 7 9 1]

[1 2 2 5 6 7 9 4]

[1 2 2 4 5 6 7 9 9]

3. Shell Sort   *7 points*

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

6	2	1	4	7	2	5	9	9
		5		6		7		9
①	1							
②		2		2		4		9

| 1 | 2 | 5 | 2 | 6 | 4 | 7 | 9 | 9 |

do insertion

1   2   5   2   6   4   7   9   9

[1]

[1   2]

[1   2   5]

[1   2   5   2]

[1   2   2   5   6]

[1   2   2   5   6   4]

[1   2   2   4   5   6   7]
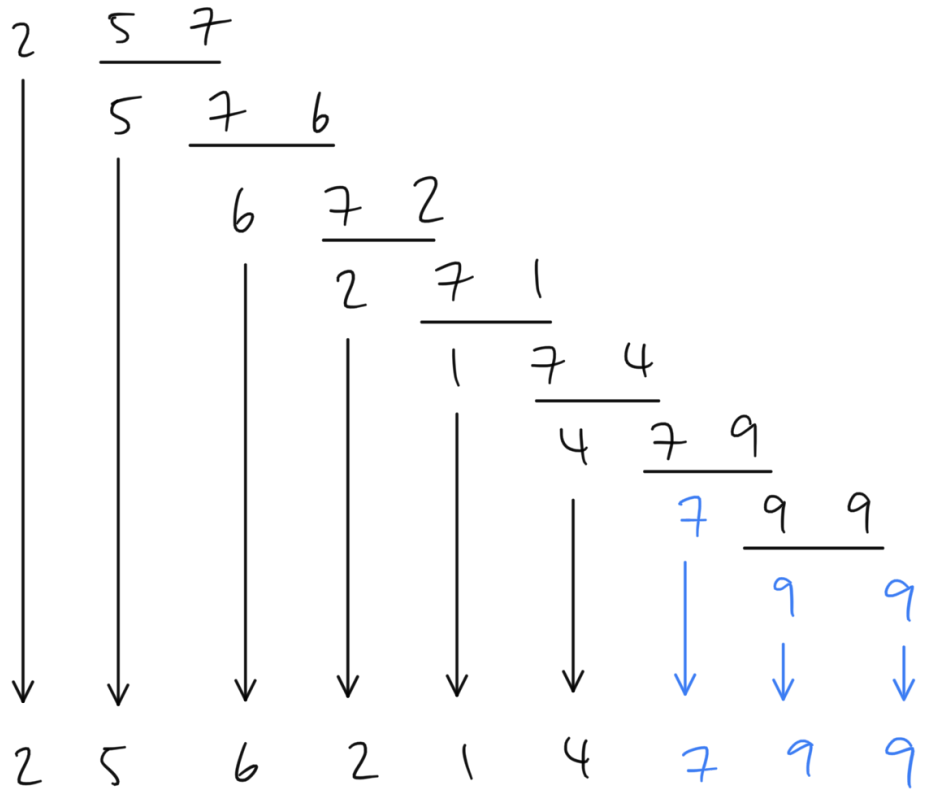
[1   2   2   4   5   6   7   9]

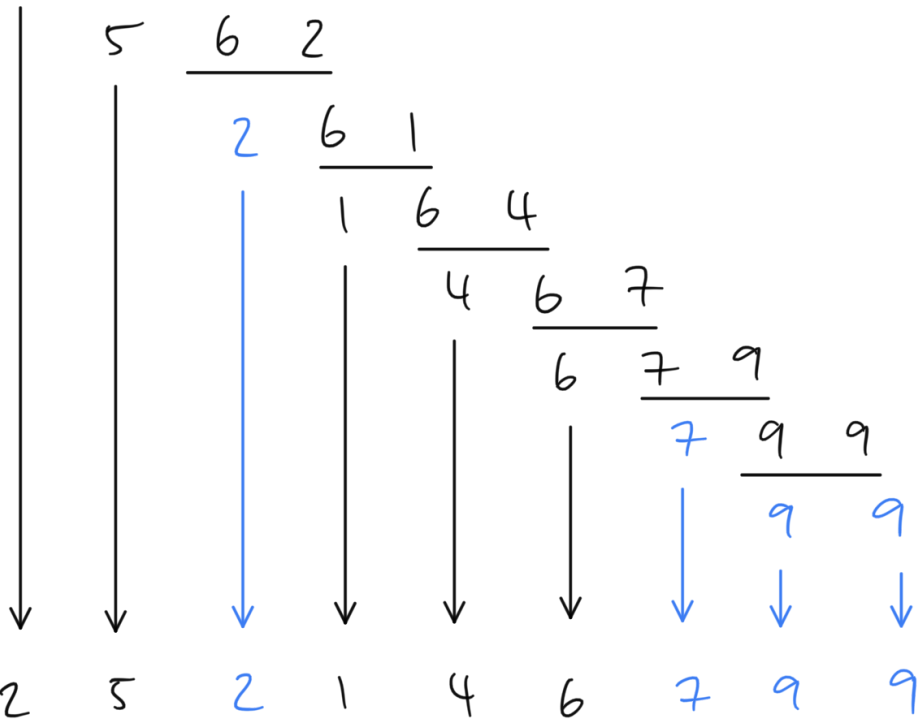[1   2   2   4   5   6   7   9   9]

4. Bubble Sort   *3 point*

7 2   5   9   6   2   1   4   9

2 7   5
      5   7   9
          7   9   6
              6   9   2
                  2   9   1
                      1   9   4
                          4   9   9
                              9   9
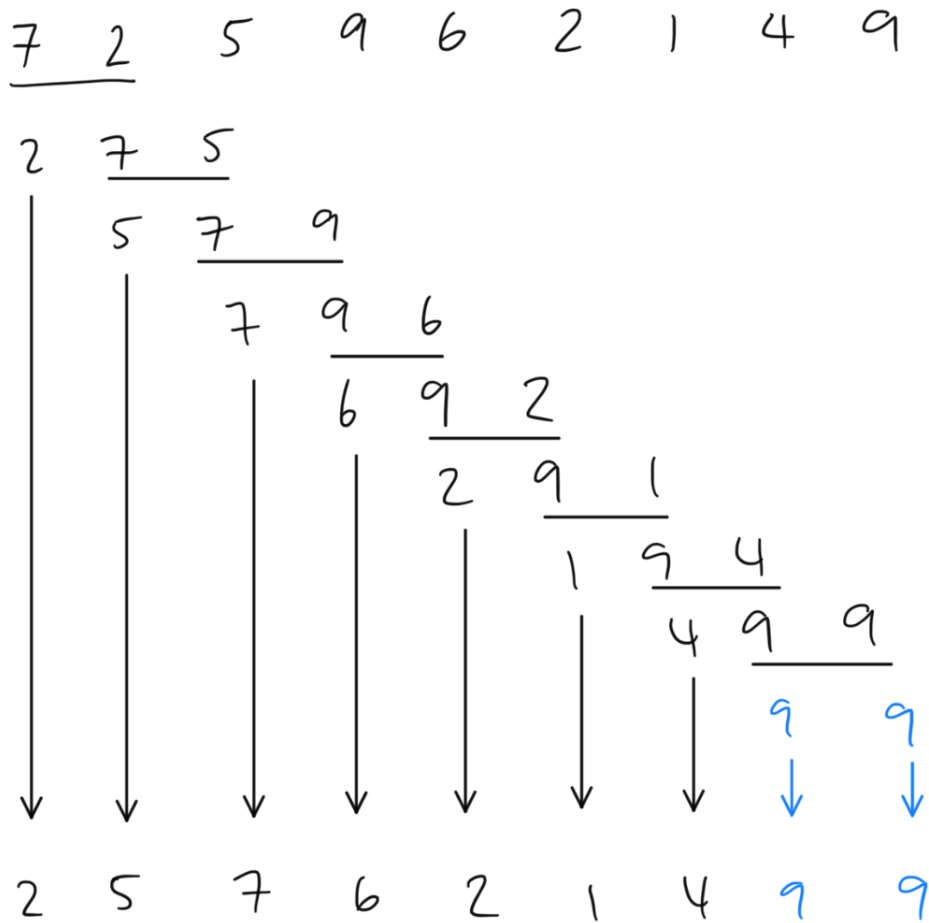
2 5   7   6   2   1   4   9   9

first pass completed

2 5   7   6   2   1   4   9   9

2   5 7
    5 7   6
       6   7 2
          2   7 1
             1   7 4
                4   7 9
                   7   9 9
                      9   9

2 5   6   2   1   4   7   9   9

Second pass completed

2 5 6 2 1 4 7 9 9

2 5 6
5 6 2
2 6 1
1 6 4
4 6 7
6 7 9
7 9 9
9 9
9 9

2 5 2 1 4 6 7 9 9

third pass completed

2 5 2 1 4 6 7 9 9

2 5 2

2 5 1

1 5 4

4 5 6

5 6 7

6 7 9

7 9 9

9 9
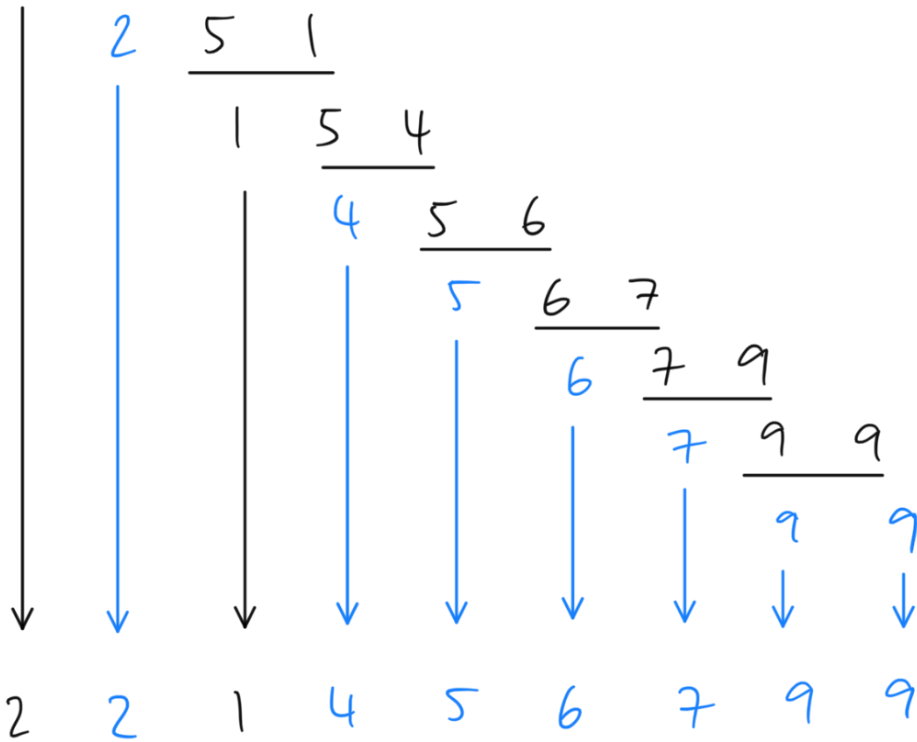
2 2 1 4 5 6 7 9 9

fourth pass completed

2 2   1   4   5   6   7   9   9

2   2 1
    1   2   4
        2   4   5
            4   5   6
                5   6   7
                    6   7   9
                        7   9   9
                            9   9

2   1   2   4   5   6   7   9   9

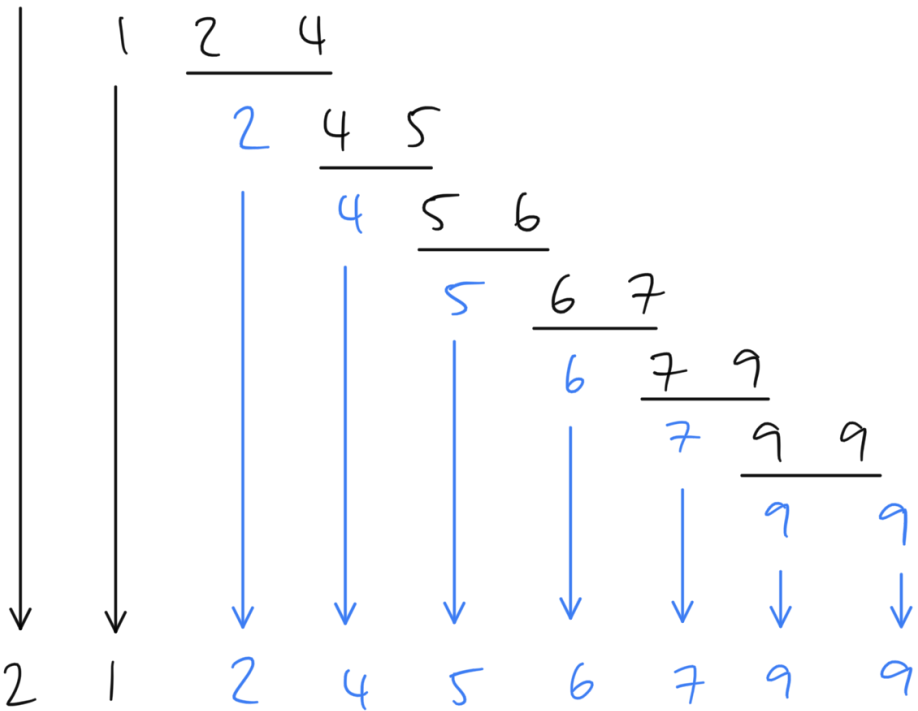fifth pass completed

2 1   2   4   5   6   7   9   9
1   2   2
    2   2   4
        2   4   5
            4   5   6
                5   6   7
                    6   7   9
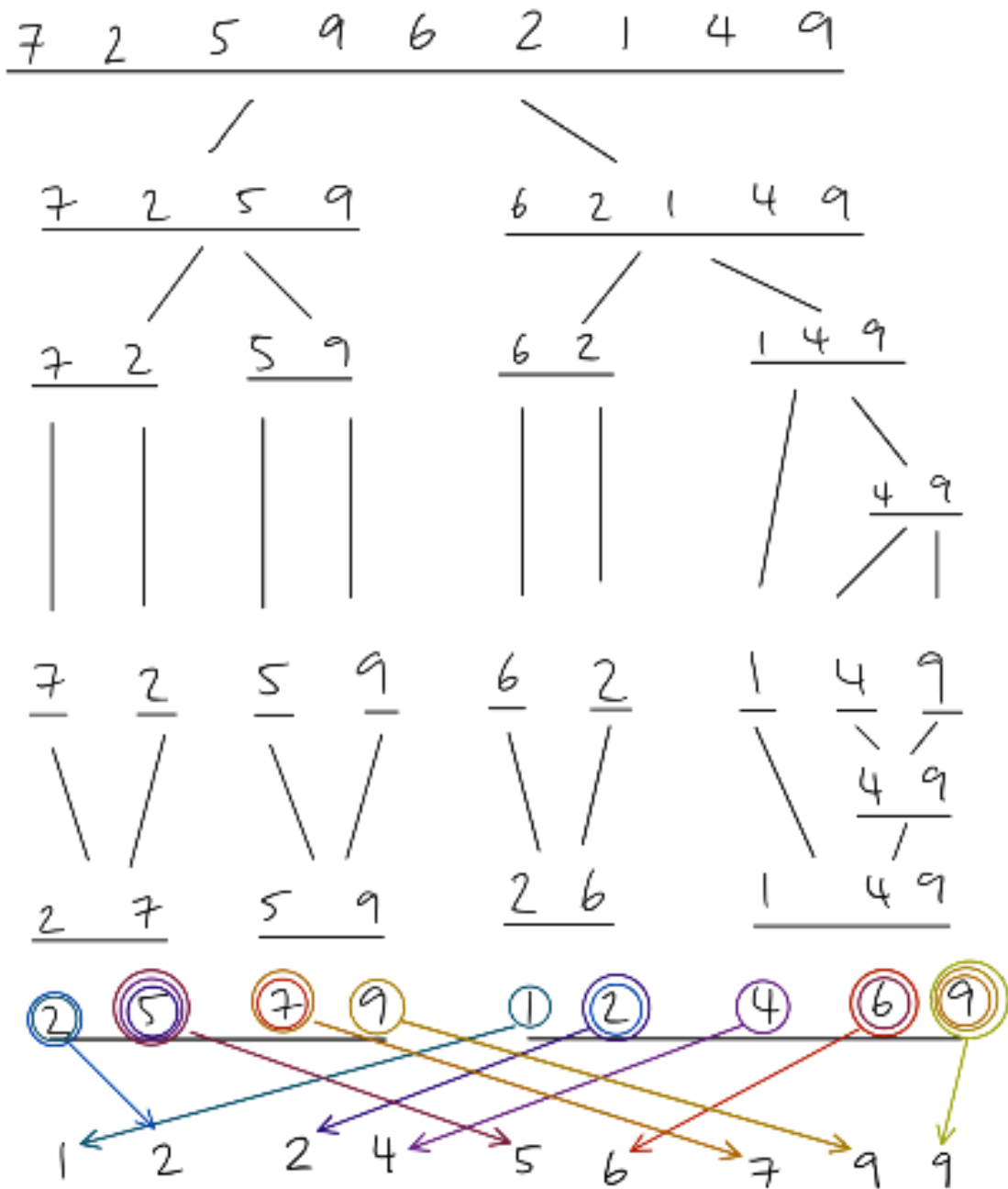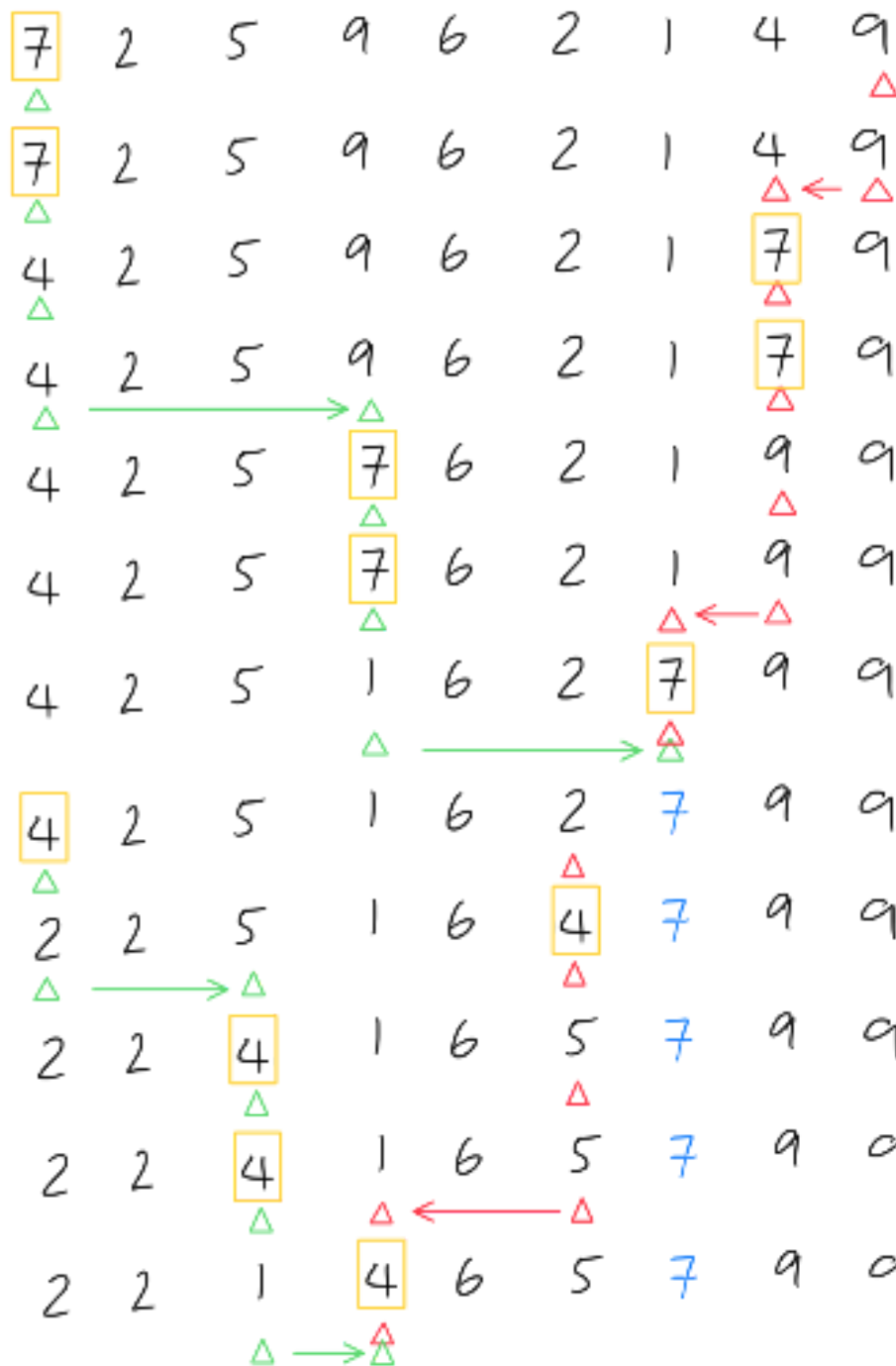   7   9   9
                            9   9

1   2   2   4   5   6   7   9   9

Sixth pass completed, all sorted

5. Merge Sort   *7 points*

7   2   5   9   6   2   1   4   9

7   2   5   9   6   2   1   4   9

7   2   5   9   6   2   1   4   9

7   2   5   9   6   2   1   4   9

                                                      4   9

                                                      4   9

2   7   5   9   2   6   1   4   9

② ⑤ ⑦ ⑨   ① ②   ④   ⑥ ⑨

1   2   2   4   5   6   7   9   9

6. Quick Sort   *7 points*

| 7 | 2 | 5 | 9 | 6 | 2 | 1 | 4 | 9 |

7 2 5 9 6 2 1 4 9 △←△

4 2 5 9 6 2 1 7 9

4 2 5 9 6 2 1 7 9 →△

4 2 5 7 6 2 1 9 9

4 2 5 7 6 2 1 9 9 △←△

4 2 5 1 6 2 7 9 9 △→△

4 2 5 1 6 2 7 9 9

2 2 5 1 6 4 7 9 9 △→△

2 2 4 1 6 5 7 9 9

2 2 4 1 6 5 7 9 9 △←△

2 2 1 4 6 5 7 9 9 △→△

2	2	1	4	6	5	7	9	9
1	2	2	4	6	5	7	9	9
1	2	2	4	6	5	7	9	9
1	2	2	4	6	5	7	9	9
1	2	2	4	6	5	7	9	9
1	2	2	4	6	5	7	9	9
1	2	2	4	6	5	7	9	9
1	2	2	4	5	6	7	9	9
1	2	2	4	5	6	7	9	9
1	2	2	4	5	6	7	9	9
1	2	2	4	5	6	7	9	9
1	2	2	4	5	6	7	9	9
1	2	2	4	5	6	7	9	9
1	2	2	4	5	6	7	9	9

It is OK to do this assignment on paper then organize the snapshots of our work in our assignment report. (Adobe Scan, Google Lens, and Office Lens are good apps, which I know, for scanning documents. Please recommend yours. Thank you.)

Coding is highly recommended but not required. Please submit a single PDF file, the assignment report.

We have been trying to wrap up the semester as soon as possible so that we can do well on our final exam and find more time for other courses. Let us find time to complete this assignment as soon as possible despite that I set it to be due on 05/07.

I am teaching one three CSC 340 sections this summer and this fall. I welcome all of us to attend the sections without enrollment (FREE) if we are interested in reviewing the materials. See you. And thank you! Best. Duc