Exercises: Sorting

Exercise 1

a. Sort the sequence 3, 1, 4, 1, 5, 9, 2, 6, 5 using insertion sort. Note, you must be able to account for any state of the sorting algorithm.

b. What is the running time of insertion sort if all elements are equal? Explain.
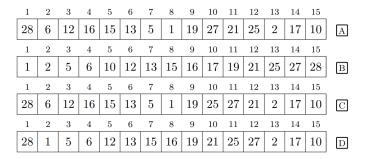
Exercise 2

Sort 3, 1, 4, 1, 5, 9, 2, 6, 5, 3, 5 using merge sort. Note, you must be able to account for any state of the sorting algorithm.

Exercise 3

Do exercises 1a and 2 for Bubble Sort, i.e. do Bubble Sort using those arrays.

Exercise 4

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
28	6	12	16	15	27	13	5	21	25	1	19	2	17	10

State the result of using `Partition(A, 2, 12)` on the array above.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
28	6	12	16	15	13	5	1	19	27	21	25	2	17	10	A

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
1	2	5	6	10	12	13	15	16	17	19	21	25	27	28	B

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
28	6	12	16	15	13	5	1	19	25	27	21	2	17	10	C

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
28	1	5	6	12	13	15	16	19	21	25	27	2	17	10	D

Exercise 5

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
11	19	6	30	15	25	10	8	28	1	24	29	22	17	12

State the result of using `Partition(A, 4, 14)` on the array above.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
11	19	6	15	10	8	1	17	28	30	24	29	22	25	12	A

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
11	19	6	15	10	8	1	17	30	25	28	24	29	22	12	B

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
1	6	8	10	11	12	15	17	19	22	24	25	28	29	30	C

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
11	19	6	1	8	10	15	17	22	24	25	28	29	30	12	D

Exercise 6

Assume we are using `MERGE-SORT` to sort the following array:

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

For each of the pair of elements, determine whether `MERGE-SORT` applied to the above array will compare the two elements when executing.

                          Yes No

3   6   ○ ○

4   7   ○ ○

6   9   ○ ○

2   3   ○ ○

Exercise 7

Sort 3, 1, 4, 1, 5, 9, 2, 6, 5, 3, 5 using quicksort. Note, you must be able to account for any state of the sorting algorithm.