

## 2) (10 pts) ALG (Sorting)

(a) (5 pts) Show the state of the following array below after each iteration of an Insertion Sort. The results after the first iteration and last iteration are included for clarity.

Original	13	6	9	44	18	22	3	11
1 <sup>st</sup> iteration	6	13	9	44	18	22	3	11
2 <sup>nd</sup> iteration	6	9	13	44	18	22	3	11
3 <sup>rd</sup> iteration	6	9	13	44	18	22	3	11
4 <sup>th</sup> iteration	6	9	13	18	44	22	3	11
5 <sup>th</sup> iteration	6	9	13	18	22	44	3	11
6 <sup>th</sup> iteration	3	6	9	13	18	22	44	11
7 <sup>th</sup> iteration	3	6	9	11	13	18	22	44

**Grading: 1 pt per row, whole row has to be perfect to get the point**

(b) (5 pts) List the **worst case** run time of each of the following sorting algorithms, in terms of  $n$ , the number of items being sorted.

- (i) Insertion Sort  $O(n^2)$
- (ii) Selection Sort  $O(n^2)$
- (iii) Heap Sort  $O(n \lg n)$  or  $O(n \log(n))$
- (iv) Merge Sort  $O(n \lg n)$  or  $O(n \log(n))$
- (v) Quick Sort  $O(n^2)$

**Grading: 1 pt for each slot, all or nothing.**