Laboratory practice No. 2: Big O Notation

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3) Practice for final project defense presentation

3.1 Value table:

Insertion Sort		Merge Sort	
Array Size	Time (ms)	Array Size	Time (ms)
0	1	0	0
1000	5	100	0
2000	7	200	1
3000	8	300	1
4000	10	400	2
5000	12	500	2
6000	14	600	3
7000	11	700	4
8000	15	800	4
9000	17	900	5
10000	23	1000	5
11000	24	1100	6
12000	29	1200	7
13000	35	1300	8
14000	37	1400	9
15000	46	1500	9
16000	50	1600	10
17000	61	1700	11
18000	67	1800	12
19000	75	1900	13
20000	100	2000	15

3.2 Graphs:

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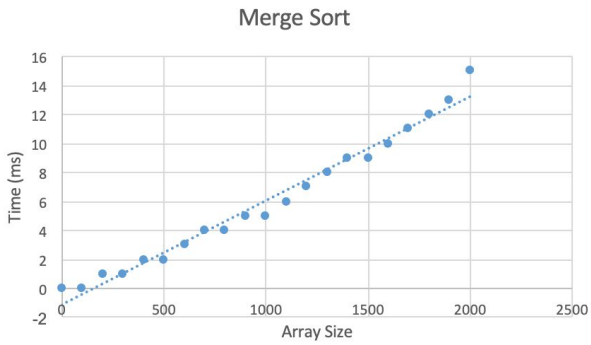

3.3 Merge sort is much more efficient than insertion sort for big arrays, as it divides the array in smaller arrays and sort them simultaneously and then just organizes the initial array. Insertion will take more time as it compares each element of the array with the previous. This is clearly visible in the complexity of them, as insertion sort's complexity is O(n)=nˆ2 and the merge sort's is O(n)=nlogn.

3.4 It is not appropriate to use insertion sort when organizing millions of elements because it will take too much time as its complexity is nˆ2.

3.5 Theoretically, n order for insertion sort to be faster than merge sort, the data that wants to be organized shall be almost sorted, if it is so, merge sort will take longer, as it has to divide the array in subarrays while, insertion sort will only has to locate the elements that are not sorted in their corresponding position and it will finish.

3.6 maxSpan algorithm key is the length of the array, if the array contains one element or is empty it should return the length of the array, likewise, if the first element of the array is equals the last, then it should also return the length of the original array, if the length of the array is bigger or equal to 2 and the first element is different than the last it should return the length of the array subtracted 1.

3.7 Complexity:

- fizzBuzz: `T(n)=C+T(n-1) O(n)=n`
- zeroMax: `T(n)=C+2*T(n-1) O(n)=n`
- zeroFront: `T(n)=C+2*T(n-1) O(n)=n`
- notAlone: `T(n)=C+T(n-1) O(n)=n`
- post4: `T(n)=C+2*T(n-1) O(n)=n`

3.8 The variable n is the size of dataset.

4) Practice for midterms

4.1 *c*
4.2 *b*
4.3 *b*
4.4 *b*
4.5 *d*
4.6 *a*
4.7 *T(n-1)+C//O(n)*

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4.8 no answer
4.9 *d*
4.10 no answer
4.11 *c*
4.12 *b*
4.13 *c*
4.14 *b*

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