# Laboratory practice No. X: Complete the title of the laboratory practice

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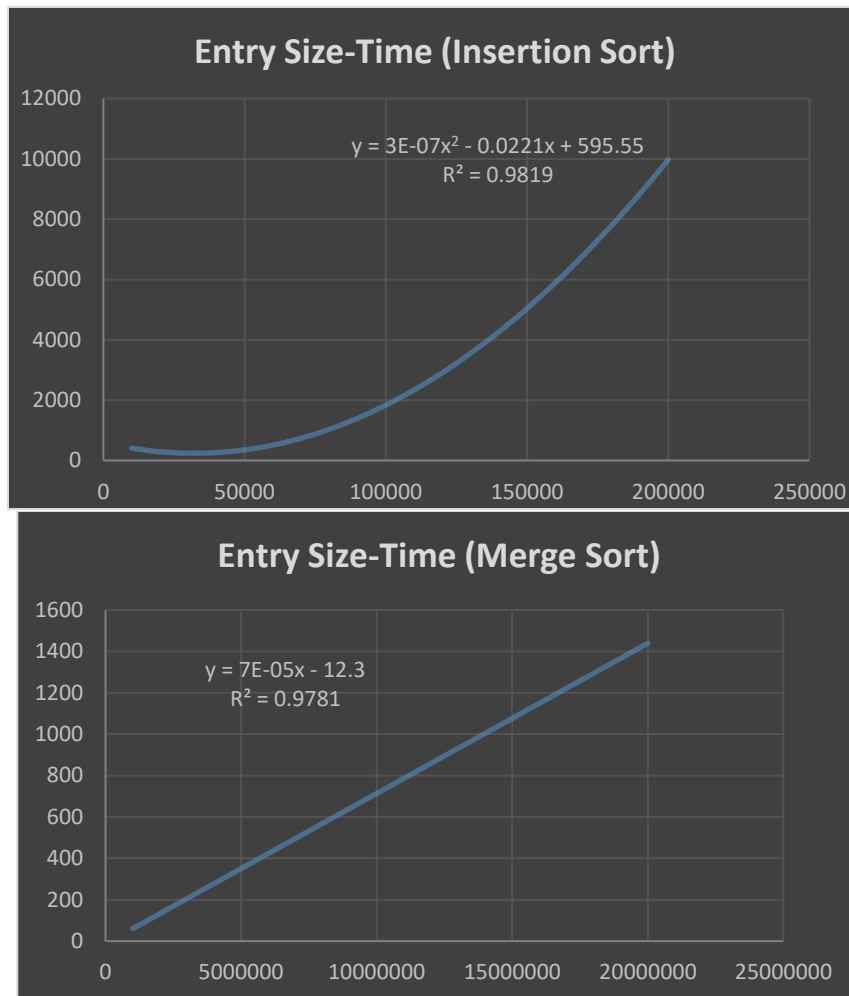## 3) Practice for final project defense presentation

### 3.1 Insertion Sort

| | |
|---|---|
| 10000 | 31 |
| 20000 | 90 |
| 30000 | 187 |
| 40000 | 327 |
| 50000 | 508 |
| 60000 | 741 |
| 70000 | 1006 |
| 80000 | 1319 |
| 90000 | 1673 |
| 100000 | 2054 |
| 110000 | 2486 |
| 120000 | 2970 |
| 130000 | 3516 |
| 140000 | 4067 |
| 150000 | 4669 |
| 160000 | 5332 |
| 170000 | 6027 |
| 180000 | 7156 |
| 190000 | 9276 |
| 200000 | 11083 |

Merge Sort

| | |
|---|---|
| 1000000 | 76 |
| 2000000 | 128 |
| 3000000 | 200 |
| 4000000 | 266 |
| 5000000 | 330 |
| 6000000 | 395 |
| 7000000 | 468 |
| 8000000 | 524 |
| 9000000 | 622 |
| 10000000 | 690 |
| 11000000 | 746 |
| 12000000 | 909 |
| 13000000 | 1021 |
| 14000000 | 1133 |
| 15000000 | 1231 |
| 16000000 | 1186 |
| 17000000 | 1199 |
| 18000000 | 1226 |
| 19000000 | 1287 |
| 20000000 | 1354 |

**3.2**

**Entry Size-Time (Insertion Sort)**

$$y = 3E\text{-}07x^2 - 0.0221x + 595.55$$
$$R^2 = 0.9819$$

**Entry Size-Time (Merge Sort)**

$$y = 7E\text{-}05x - 12.3$$
$$R^2 = 0.9781$$

**3.3** Merge Sort is much more effective than the insertion sort in big numbers, since merge sort has a linear complexity it makes its run time much smaller for big arrays.

**3.4** Insertion sort starts taking up too much time when it comes to big arrays, because of its complexity $O(n^2)$ it makes it difficult for this sort to deal with millions of elements in seconds.

**3.5** When it comes to small arrays the insertion sort is more effective than the merge sort because it directly starts organizing the array, unlike the merge sort that first has to decompose the array into its parts.

**3.6** Arrays Coding Bat complexity:
    **3.6.1.** Arrays 2:
        **3.6.1.1.** count evens: $O(n)$

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**Inspira Crea Transforma**

**3.6.1.2.** Big dif: O(n)
**3.6.1.3.** Centered average: O(n)
**3.6.1.4.** sum 13: O(n)
**3.6.1.5.** sum 67: O(n)
**3.6.2.** Arrays 3:
**3.6.2.1.** maxSpan: O(n^2)
**3.6.2.2.** fix34: O(n^2)
**3.6.2.3.** fix45: O(n^2)
**3.6.2.4.** canBalance: O(n)
**3.6.2.5.** LinearIn: O(n*m)
**3.7** n y m son el número de elementos del arreglo

## 4) Practice for midterms

**4.1** C)
**4.2** B)
**4.3** B)
**4.4** B)
**4.5**
**4.5.1.** D)
**4.5.2.** A)
**4.1** 10.000 seconds
**4.7** 1,2.3,4 are all true
**4.8** A)
**4.9** A)
**4.10** A)
**4.11** C)
**4.12** C)
**4.13** C)
**4.14** A)

## 6) Team work and gradual progress (optional)

The team worked through Discord on March 3rd for around 2 hours from 9pm to 11 pm and the work was divided in the 2 computers worked with.

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