

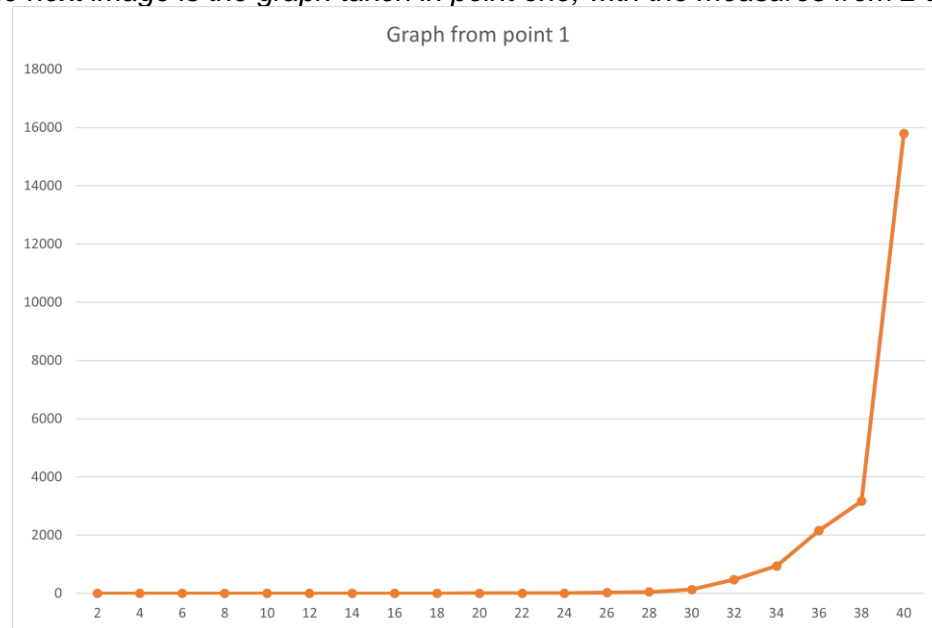
## Laboratory practice No. 1: Recursion

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### 3) Practice for final project defense presentation

*The next image is the graph taken in point one, with the measures from 2 to 40*



Keep in mind that the x-axis is the amount of numbers used and y-axis is the time in milliseconds

**3.1** This is allegedly unnecessary.

**3.2** The graph shows that the increments start going up in big amounts.

**3.3** The code for reading the subsequent chains is too complex for such a big String (that String being 300000 characters long), therefore, the usage of the datasets with this code is high on impossible.

**3.4** This one is just optional, so we decided to skip it for time's sake.

**3.5** The next formula applies for all of recursion 1:  $T(n) = cn + c_1 \iff O(n)$

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## ESTRUCTURA DE DATOS 1

### Código ST0245

The following formulas are for recursion 2:

GroupNoAdj:

$$T(n) = -\frac{1}{4}c((-1)^{2n} - 2n) + c_2(-1)^n + c_1 \quad (\text{where } c_1 \text{ and } c_2 \text{ are arbitrary parameters})$$

GroupSum5

$$T(n) = cn + c_1 \quad (\text{where } c_1 \text{ is an arbitrary parameter})$$

GroupSumClump

$$T(n) = c(2^n - 1) + c_1 2^{n-1} \quad (\text{where } c_1 \text{ is an arbitrary parameter})$$

SplitArray and SplitArray53

$$T(n) = cn + c_1 \quad (\text{where } c_1 \text{ is an arbitrary parameter})$$

**3.6** N is the quantity of data the recursion is made. As it implies, this can vary

## 4) Practice for midterms

**4.1** 1) c. s.substring(i, n), this decision was made due to the code not having recursion in the specified line, thus, we need two established variables that can continuously tell us which substring we are choosing.

2) c. true, this decision was made by process of elimination (somewhat), this is because the other options were either not compatible with the type of value the return had to give, or would make the if have no purpose.

2) c. solve.(t, substring(n), l-n), this decision was made because it was the most accurate one in our eyes.

**4.2** 1) a. True, this decision was made as logarithms cannot give a negative number as an answer

2) (A) True, as this goes accord with the principles of functions

(B) True, as a logarithm cannot poses a negative number as a base

(C) False, as  $O=(\log(n))$

(D) Uhhhhh, What...?

**4.3** D.  $T(n,m)=C \times n \times m^3$ , this decision was made because when calculating the complexity of each line in the code, the highest power the m got was 3.

**4.4** C. Because that is the formula for the Lucas' numbers

**4.5** 1) a. True because this makes a string that has 0 or 1 characters return true, which is correct, as a word of 0 or 1 letters is a palindrome in and of itself.

2) b.  $s.charAt(0)==(s.charAt(s.length()-1))$ , this line of code compares the first and the last character of the string, which is what the code is intended to do,

3) a.  $T(n)=T(n-1)+c$  this is because this is the complexity formula for recursive codes, also, b and c just don't make sense in a recursive standpoint

**4.6** 1)  $\text{return sumaAux}(n.\text{substring}(i+2), i)$ ; this is because this is the thing that the if checks, if the 2 adjacent numbers are the same, do not use them in the final sum, therefore if  $\text{charAt}(i)==\text{charAt}(i+1)$ , the two numbers that are the same are skipped, and the string given afterward is the remainder of the number after that

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**ESTRUCTURA DE DATOS 1**  
**Código ST0245**

2) (sumaAux, charAt(i+1), i); this returns the number at a certain spot in the string, turning it into an int, and using it for the final sum

### 5) Recommended reading (optional)

Mapa conceptual

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

- 6.1** Started Saturday 5:00 p.m to 8:00 p.m (Finished points 1.1 and 1.2)  
Continued Sunday 12:00 p.m to 10:30 p.m (Attempted to work point 3, to no avail.  
Finished most of point 2)  
Continued Monday 4:00pm to ~10:00 pm (Began and finished point 4, finished the last bit of point 2)  
Finished Tuesday 7:50pm to (Began and finished point 3)
- 6.2** Saturday: Began and finished the codes for points 1.1 and 1.2  
Sunday: Began and made significant process in points 2.1 and 2.2  
Monday: Finished the remainder of point 2.2  
Tuesday: Began and finished the entirety of point 3
- 6.3** From what I understand, this is just mentioning the things that were mentioned in the points 6.2 and 6.3

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