Algorithmics	Student information	Date	Number of session
	UO: 282650	20/02/23	1.2
	Surname: Fernández Noriega		
	Name: Christian		

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Activity 1. Two algorithms with the same complexity

N	Loop2(t)	Loop3(t)	Loop2(t)/Loop3(t)
8	2	1	2
16	3	2	1.5
32	10	5	2
64	40	21	1.9047
128	159	82	1.9390
256	630	314	2.006369
512	2579	1275	2.02274
1024	10140	5103	1.98706
2048	40954	20280	2.01942
4096	164210	81386	2.01766
…	…	…	Tends to 2

(1000 repetitions)

The results make sense as Loop2 has a O(n2) complexity and so does Loop3, with the difference that Loop2 is 2N2 and the other just N2, so that difference is reflected in the division, tending to 2 as N increases.

Activity 2. Two algorithms with different complexity

N	Loop1(t)	Loop2(t)	Loop1(t)/Loop2(t)
8	1	2	0.5
16	1	3	0.333
32	2	10	0.2
64	5	40	0.125
128	10	159	0.06289
256	23	630	0.03650

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512	52	2579	0.02162
1024	110	10140	0.01084
2048	238	40954	0.005811
4096	523	164210	0.003184
…	…	…	Tends to 0

(1000 repetitions)

The results make sense, as the complexity of Loop1 is O(nlogn) and for Loop2 it is O(n2), which is larger, so the division tends to 0 as N increases.

Activity 3. Complexity of other algorithms

N	Loop4(t)	Loop5(t)	Loop4(t)/Loop5(t)
8	1	0	-
16	3	1	3
32	13	4	3.25
64	162	20	8.1
128	2616	163	16.049
256	41600	1457	28.5518
512	663169	13015	50.9542
1024	…	112701	…
…	…	…	Tends to infinity

(1 repetition)

The results make sense as Loop4 has a O(n4) complexity and Loop5's is O((logn)n3), which is smaller, so the division tends to infinity as N increases.

Activity 4. Study of unknown.java

N	Unknown
8	1

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16	1
32	4
64	26
128	182
256	1115
512	7519
1024	55979
2048	413464

(1000 repetitions (microseconds))

The complexity is O(n3), which is reflected on the table

For example, if we know that N=512 takes 7519 microseconds, to calculate the time for N=1024 considering this is a O(n3) complexity, would be: 60152, which is somewhat close to the real value in this case