Algorithmics	Student information	Date	Number of session
	UO: 282276	17/02/2022	1.2
	Surname: Cadenas Blanco		
	Name: Andrés		

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Activity 1. Two algorithms with the same complexity

They do make sense as the growth in time is (k^2*t2) being k^2 = 4 in both cases and the better performance f the second is due to the way the data is treated.

Specs of the computer: Intel i7-10750H RAM: ddr4 32gb

N	loop2(t) (ms)	loop3(t) (ms)	loop2(t)/loop3(t)
8	1	1	1
16	3	1	3
32	9	5	1,8
64	36	21	1,714285714
128	139	74	1,878378378
256	560	275	2,036363636
512	2215	1105	2,004524887
1024	8730	4604	1,896177237
2048	34796	18385	1,892629861

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Activity 2. Two algorithms with different complexity

It does seem correct as loop 2 has a complexity of O(n^2) and loop 1 has the complexity of O(n*log(n)) which is way faster than O(n^2), that's why the ratio is less than 0 and the bigger the n the bigger the difference between both algorithms.

Specs of the computer: Intel i7-10750H RAM: ddr4 32gb

N	loop1(t) (ms)	loop2(t) (ms)	loop1(t)/loop2(t)
8	0	1	0
16	1	3	0,333333333
32	3	9	0,333333333
64	4	36	0,111111111
128	9	139	0,064748201
256	23	560	0,041071429
512	51	2215	0,023024831
1024	106	8730	0,012142039
2048	230	34796	0,006609955

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Activity 3. Complexity of other algorithms

As the loop4 has O(n^4) and loop5 has O(n^3*log(n)) it can be seen in the proportion column how the proportion grows quadratically and it meets the results.

Specs of the computer: Intel i7-10750H RAM: ddr4 32gb

N	Loop4 (ms)	Loop5 (ms)	Loop4/Loop5 (ms)
8	0	0	1
16	2	1	2
32	12	3	4
64	145	18	8,055555556
128	2183	159	13,72955975
256	34798	1303	26,70606293

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Activity 4. Study of Unknown.java

Yes, it does meet its theoretical complexity as it is expected to be cubic. If you use the formula:

$$t2 = k^c * t1$$

You obtain that t2 = 2^3*t1 for example with t1 = 181 it means that t2 should be 1448 and the real value is 1602 they are more or less close to each other so it could be seen as the theoretical and the real are plausible.

Specs of the computer: Intel i7-10750H RAM: ddr4 32gb

N	Unknown.java (ms)
8	3
16	21
32	181
64	1602
128	14416
256	130569