

Algorithmics	Student information	Date	Number of session
	UO: 283928	22/02/2022	1_2
	Surname: Suárez Losada		
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## Activity 1. Two algorithms with the same complexity

N	loop2(ms)	loop3(ms)	loop2(ms) / loop3(ms)
8	0	0,001	0
16	0,003	0,003	1
32	0,01	0,008	1,25
64	0,046	0,022	2,09090909
128	0,16	0,083	1,92771084
256	0,619	0,326	1,89877301
512	2,483	1,278	1,9428795
1024	10,197	5,207	1,95832533
2048	41,721	21,195	1,96843595
4096	162,006	82,957	1,95289126

CPU: intel i5-10400 @ 2.90GHz, 2904 MHz, 6 physical cores, 12 logical cores.

RAM: 16GB

The results are logical as loop2 has a quadratic complexity while loop3 has half quadratic complexity( loop3's i iterates over n and j over l, so half of the values are ignored ).

## Activity 2. Two algorithms with different complexity

N	loop1(ms)	loop2(ms)	loop1(ms) / loop2(ms)
8	0	0,001	0
16	0,001	0,003	0,33333333
32	0,002	0,009	0,22222222
64	0,005	0,038	0,13157895
128	0,009	0,152	0,05921053
256	0,022	0,605	0,03636364
512	0,047	2,439	0,01927019
1024	0,111	9,528	0,01164987
2048	0,227	37,989	0,00597541
4096	1,06	153,526	0,00690437

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The results make sense as loop1 has a  $O(n \log n)$  complexity while loop2 has a  $O(n^2)$  one, so loop2 grows much faster than loop1.

## Activity 3. Complexity of others algorithms

N	loop4(ms)	loop5(ms)	loop4(ms) / loop5(ms)	
8	0	0		#jDIV/0!
16	0,375	0,25		1,5
32	2,75	0,75		3,66666667
64	39,875	4,875		8,17948718
128	627,625	45		13,9472222
256	9958,875	407,625		24,4314627
512	159031,125	3654,375		43,5180092

As loop4 has a  $O(n^4)$  complexity and loop5 a  $O(n^3 \log n)$ , loop4 grows way faster than loop5 so the values are logical.

## Activity 4.

N	Unknown(ms)
8	0
16	0
32	0,125
64	0,125
128	0,5
256	0,625
512	1,125
1024	7,625
2048	49,5
4096	302,875
8192	1922,75
16384	13275,875

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T (n = 1024): 7,625 -> T( n = 2048): 61ms

T (n = 4096): 302.875 -> T( n =8192): 2423ms

Although the values are not so close to the real values, they are not so distant neither.  
Around a 20% more.