

Algorithmics	Student information	Date	Number of session
	UO: 299874	17/02/2025	3
	Surname: Puebla		
	Name: Álvaro		



Escuela de
Ingeniería
Informática
Universidad de Oviedo



Universidad de Oviedo
Universidá d'Uviéu
University of Oviedo

Activity 1. Some iterative models

N	tLoop1 (mS)	tLoop2 (mS)	tLoop3 (mS)	tLoop4 (mS)
100	0.00678	0.167	0.797	0.641
200	0.01204	0.604	3.544	4.574
400	0.03165	2.790	14.667	34.8
800	0.06850	13.127	62.9	268.1
1600	0.17307	49.6	263.4	2120
3200	0.35820	224.7	1120.2	16724
6400	0.726	894.5	4681.9	133836
12800	1.544	4098	19612	OoT
25600	3.143	18001	82583	OoT
51200	6.303	71268	337330	OoT

tLoop1 grows $O(n \cdot \log(n))$

tLoop2 grows $O(n^2 \cdot \log(n))$

tLoop3 grows $O(n^2 \cdot \log(n))$

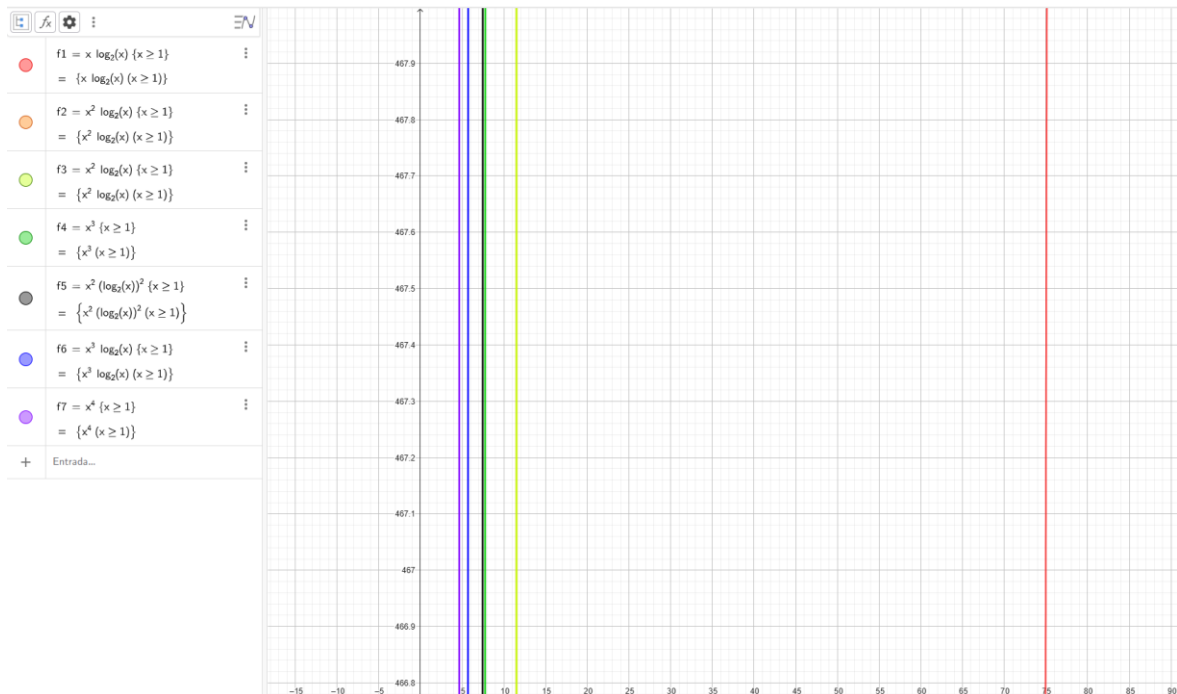
tLoop4 grows $O(n^3)$

Activity 2. Iterative models of a given time complexity

N	tLoop5 (mS)	tLoop6 (mS)	tLoop7 (mS)
100	4.07	52.10	386.8
200	19.55	447	6199
400	92.70	3863	98658
800	434	32395	OoT
1600	2017	OoT	OoT
3200	9292	OoT	OoT
6400	41805	OoT	OoT

Loop5: $O(n^2 \log^2 n)$, Loop6: $O(n^3 \log n)$, Loop7: $O(n^4)$

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As you can see, if the fline is more near the zero, means that it grows more that the others that are more on the right.

Activity 3. Compare t1 and t2

N	tLoop1 (mS)	tLoop2 (mS)	t1 / t2
100	0.00678	0.167	0.0406
200	0.01204	0.604	0.0199
400	0.03165	2.790	0.0113
800	0.06850	13.127	0.0052
1600	0.17307	49.6	0.0035
3200	0.35820	224.7	0.0016
6400	0.726	894.5	0.0008
12800	1.544	4098	0.0004
25600	3.143	18001	0.0002
51200	6.303	71268	0.0001

The Loop1 is less complex than the Loop2 as it tends to 0 (t1/t2)

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Activity 4. Compare t2 and t3

N	tLoop2 (mS)	tLoop3 (mS)	t2 / t3
100	0.167	0.797	0.2095
200	0.604	3.544	0.1704
400	2.790	14.667	0.1902
800	13.127	62.9	0.2087
1600	49.6	263.4	0.1883
3200	224.7	1120.2	0.2006
6400	894.5	4681.9	0.1911
12800	4098	19612	0.2090
25600	18001	82583	0.2180
51200	71268	337330	0.2113

The Loop2 has the same complexity than the Loop3 as neither goes to 0 nor infinity (t_2/t_3)

Activity 5. Different environments

N	L4 PY (mS)	L4 JWN (mS)	L4 JW (mS)	JWN / PY	JW/JWN
200	24	4.574	0.84	0.1906	0.1836
400	100	34.8	4.97	0.3480	0.1428
800	1600	268.1	30.65	0.1676	0.1143
1600	13000	2120	205.98	0.1631	0.0972
3200	123000	16724	1396.8	0.1360	0.0835
6400	OoT	133836	11116	-	0.0831

As is the same algorithm, all the divisions show a similar result, as it compares the algorithm not the machine that runs it.