Algorithmics	Student information	Date	Number of session
	UO:UO293693	29/02/2024	3
	Surname: Castro Álvarez		
	Name: Ana		

Escuela de Ingeniería Informática
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Activity 2. Divide and Conquer by subtraction

In subtraction 1 it is at n = 8192 because the stack overflows

In subtraction 2 it is at n = 8192 because the stack overflows

Subtraction 3 - n=20**TIME=60**cont=1

$$t_2 = \frac{2^{n_2}}{2^{n_1}} \cdot \; t_1 = \frac{2^{80}}{2^{20}} \cdot \; 0{,}076 = 8{,}76 \cdot 10^{15}$$

That is 2,79*10^9 years

N	tSubtraction4
100	5
200	39
400	294
800	2330
1600	18707

N	tSubtraction5
30	625
32	1887
34	5642
36	16661

$$t_2 = \frac{3^{\frac{n_2}{2}}}{3^{\frac{n_1}{2}}} \cdot t_1 = \frac{3^{\frac{80}{2}}}{3^{\frac{30}{2}}} \cdot 625 = \frac{3^{40}}{3^{15}} \cdot 625 = 5{,}3 \cdot 10^{14}$$

That is 1,68 ·10^4 years

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Activity 3. Divide and conquer by division

N	tDivision4	tDivision5
1000	22	56
2000	76	211
4000	301	796
8000	1179	3158
16000	4706	13036
32000	19484	52151
64000	Out of time	Out of time

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Activity 4. Two basic examples

N	tVectorSum1	tVectorSum2	tVectorSum3
3	0,000056	0,000110	0,000135
6	0,000079	0,000174	0,000236
12	0,000139	0,000290	0,000639
24	0,000245	0,000561	0,001012
48	0,000440	0,001088	0,002040
96	0,000842	0,002233	0,007619
192	0,001707	0,004980	0,011321
384	0,003505	0,010963	0,017985
768	0,006683	0,020522	0,045366
1536	0,013219	0,043699	0,098992
3072	0,026647	0,087821	0,202679
6144	0,052885	0,183813	0,322595
12288	0,103282	Out of memory	Out of time

Given the last row of the table for which the three algorithms have time, I can confirm that the most efficient one is the first one

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N	tFibonacci1	tFibonacci2	tFibonacci3	tFibonacci4
10	0,000132	0,000178	0,000243	0,0033
15	0,000178	0,000249	0,000332	0,0336
20	0,000224	0,000335	0,000432	0,3942
25	0,000273	0,000399	0,000519	5,9885
30	0,000331	0,000467	0,000617	49,4352
35	0,000373	0,000541	0,000728	Out of time
40	0,000412	0,000615	0,000832	Out of time
45	0,000484	0,000686	0,001641	Out of time
50	0,000511	0,000761	0,001587	Out of time
55	0,000820	0,000836	0,001140	Out of time
59	0,000595	0,000893	0,001235	Out of time

Given the last row of the table for which the four algorithms have time, I can confirm that the most efficient one is the first one

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Activity 5. Another task

N	Ordered	Reversed	Random (M)	Random (Q)
31 250	LoR	LoR	LoR	LoR
62 500	54	53	51	LoR
125 000	115	97	111	64
250 000	225	207	238	136
500 000	499	431	500	290
1 000 000	1059	947	1069	618
2 000 000	2158	1881	2244	1312
4 000 000	4420	4107	4613	2848
8 000 000	9282	8586	9548	6503
16 000 000	18741	17323	19216	16823
32 000 000	41479	38096	40755	44656

The constant we obtain is between 1,6 and 1,75

N	Random (M)	Random (Q)	Merge/Quick
125 000	111	64	1,73
250 000	238	136	1,75
500 000	500	290	1,72
1 000 000	1069	618	1,73
2 000 000	2244	1312	1,71
4 000 000	4613	2848	1,62
8 000 000	9548	6503	1,47
16 000 000	19216	16823	1,14
32 000 000	40755	44656	0,91