Algorithmics	Student information	Date	Number of session
	UO:300896 Surname: De San Claudio Mesa Name: Alejandro	6/02/25	2

Activity 1.1 [For what value of n do the Subtraction1 and Subtraction2 classes stop giving times (we abort the algorithm because it exceeds 1 minute)? Why does that happen?]

It stops giving values at 8192. Because it gives a `StackOverflowError.`

Activity 1.2 [How many years would it take to complete the Subtraction3 execution for n=80? Reason the answer.]

Since a = 2, b = 1 and k = 0

Complexity is a^(n/b)

So for n = 80 it would take around 2^80ms * TimePerInstruction =

43.152.365.729.557.250.048ms OR 1368352540 years.

Activity 1.3 [Implement a Subtraction4.java class with a complexity O(n3) and then fill in a table showing the time (in milliseconds) for n=100, 200, 400, 800, ... (until OoT).

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To obtain n^3 we look for an algorithm such as a = 1 and k = 2 by substraction

n	*Time ms*
100	1
200	11
400	79
800	622
1600	4905
3200	38856

Activity 1.4 [Implement a Subtraction5.java class with a complexity O(3n/2) and then fill in a table showing the time (in milliseconds) for n=30, 32, 34, 36, … (until OoT).

To obtain 3^(n/2) we look for an algorithm such as a = 3 and b = 2 by substraction

n	*Time ms*
30	307
32	874
34	2617
36	7828
38	23742

Activity 1.5 [How many years would it take to complete the Subtraction5 execution for n=80? Reason the answer.)

Since complexity is 3^(n/2) it would take 3^40ms * TimePerInstruction =

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Taking into account 3^15 * TimePerInstruction = 307

So 3^40 * 2,139535784851069144151537117078e-5 =

260.117.603.099.001ms = 8248 years

Activity 2.1 [Implement a Division4.java class with a complexity O(n2) (with a<b^k) and then fill in a table showing the time (in milliseconds) for n=1000, 2000, 4000, 8000, … (up to OoT).]

K = 2

b = 2

a = 1

n	*Time ms*
1000	6
2000	21
4000	78
8000	308
16000	1219
32000	4817
64000	19854

Activity 2.2 [Implement a Division5.java class with a complexity O(n2) (with a>b^k) and then fill in a table showing the time (in milliseconds) for n=1000, 2000, 4000, 8000, … (up to OoT).]

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K = 0

b = 2

a = 4

n	*Time ms*
1000	19
2000	74
4000	293
8000	1158
16000	4563
32000	18428

Activity 3.2 [After analyzing the complexity of the various algorithms within the two classes, executing them and after putting the times obtained in a table, compare the efficiency of each algorithm.

VectorSum2.java

1

(IMPORTANT: TIMES ARE MULTIPLIED BY 100000)

n	*Time ms*
3	5
6	7
12	10
24	14
48	23
96	42
192	77
384	146
768	285
1536	565
3072	1129
6144	2244
12288	4499
24576	9017

49152	18033
98304	36408

2

(IMPORTANT: TIMES ARE MULTIPLIED BY 100000)

n	*Time ms*
3	7
6	12
12	24
24	41
48	81
96	159
192	308
384	608
768	1211
1536	2414
3072	4841
6144	9725
12288	SO
24576	SO
49152	SO
98304	SO

3

(IMPORTANT: TIMES ARE MULTIPLIED BY 100000)

n	*Time ms*
3	9
6	18
12	39
24	76
48	155
96	304
192	613
384	1216
768	2458
1536	4893
3072	9821

Algorithmics	Student information	Date	Number of session
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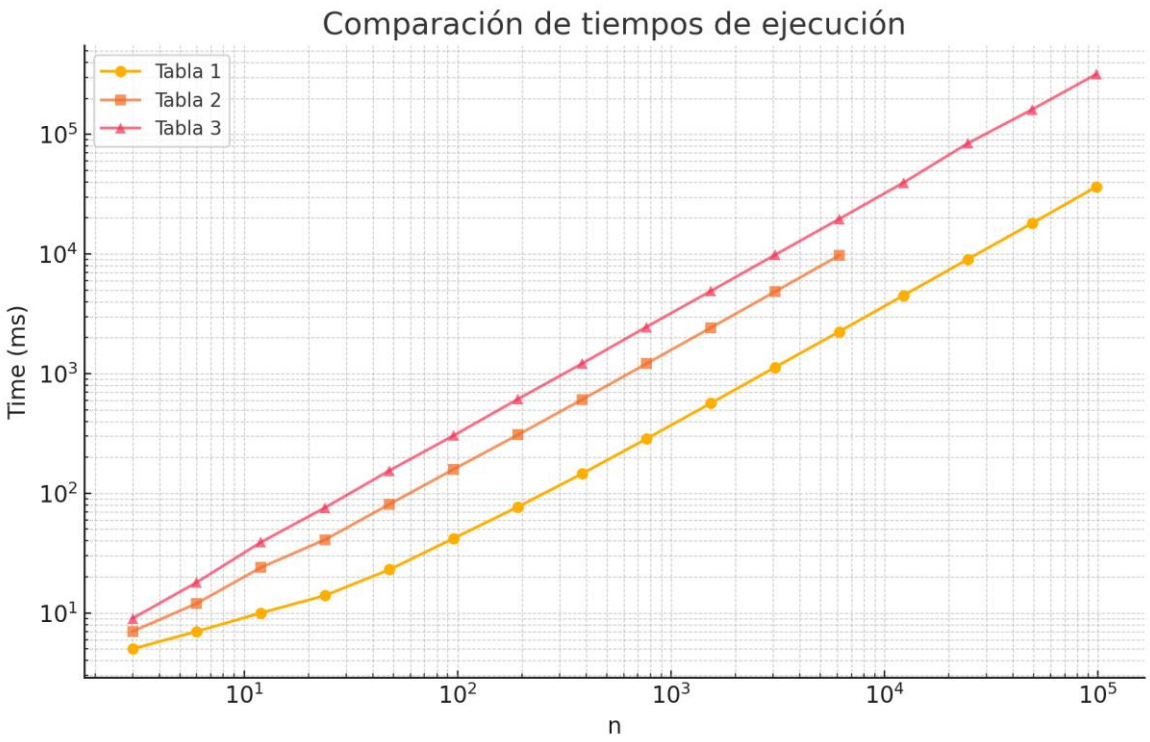
6144	19616
12288	39462
24576	84000
49152	161000
98304	318000



Fibonacci2.java

1

(IMPORTANT: TIMES ARE MULTIPLIED BY 1000000)

n	*Time ms*
10	86
11	89
12	92
13	99
14	102

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15	106
16	111
17	120
18	117
19	122
20	126
21	135
22	137
23	142
24	145
25	148

2

(IMPORTANT: TIMES ARE MULTIPLIED BY 1000000)

n	*Time ms*
10	112
11	117
12	126
13	127
14	134
15	143
16	149
17	157
18	165
19	170
20	179
21	188
22	190
23	200
24	205
25	210

3

(IMPORTANT: TIMES ARE MULTIPLIED BY 1000000)

n	*Time ms*
10	172
11	184

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12	221
13	238
14	256
15	266
16	282
17	297
18	315
19	325
20	343
21	358
22	370
23	389
24	402
25	415