PRÁCTICA 3: DIVIDE Y VENCERÁS

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| Procesador: | 11th Gen Intel(R) Core(TM) i7-1165G7 @ 2.8GHz |
| Memoria: | 16 GB |  |  |  |

Información del sistema:

**Sustracción1**: Complejidad temporal O(n), con un gasto de pila O(n). En consecuencia, la pila se desborda.

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| --- | --- | --- | --- | --- |
| N | nVeces | t Sustraccion 1 | | t Sustraccion 1/nVeces |
| miliseg | seg |
| 100 | 1000000 | 150 | 0,15000 | 0,0000001500 |
| 200 | 306 | 0,30600 | 0,0000003060 |
| 400 | 500 | 0,50000 | 0,0000005000 |
| 800 | 996 | 0,99600 | 0,0000009960 |
| 1600 | 1454 | 1,45400 | 0,0000014540 |
| 3200 | 6333 | 6,33300 | 0,0000063330 |
| 6400 | 33576 | 33,57600 | 0,0000335760 |
| 12800 | 78370 | 78,37000 | 0,0000783700 |
| 25600 | 167215 | 167,21500 | 0,0001672150 |
| 51200 | 362850 | 362,85000 | 0,0003628500 |
| StackOverflowError | | | | |

**Sustracción2**: Complejidad temporal O(n^2), con un gasto de pila O(n). En consecuencia, la pila se desborda.

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| --- | --- | --- | --- | --- |
| N | nVeces | t Sustraccion 2 | | t Sustraccion 2/nVeces |
| miliseg | seg |
| 1 | 100000000 | 314 | 0,31400 | 0,000000003140 |
| 2 | 684 | 0,68400 | 0,000000006840 |
| 4 | 1657 | 1,65700 | 0,000000016570 |
| 8 | 8526 | 8,52600 | 0,000000085260 |
| 16 | 46254 | 46,25400 | 0,000000462540 |
| 32 | 59571 | 59,57100 | 0,000000595710 |
| 64 | 100000 | 71 | 0,07100 | 0,000000710000 |
| 128 | 143 | 0,14300 | 0,000001430000 |
| 256 | 346 | 0,34600 | 0,000003460000 |
| 512 | 1012 | 1,01200 | 0,000010120000 |
| 1024 | 6870 | 6,87000 | 0,000068700000 |
| 2048 | 39352 | 39,35200 | 0,000393520000 |
| 4096 | 96119 | 96,11900 | 0,000961190000 |
| 8192 | 259469 | 259,46900 | 0,002594690000 |
| 16384 | 10 | 107 | 0,10700 | 0,010700000000 |
| StackOverflowError | | | | |

**Sustracción3**: Complejidad temporal O(2^n), con un gasto de pila O(n). La pila no se desborda porque mucho antes el tiempo de ejecución se hace intratable.

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| --- | --- | --- | --- | --- |
| N | nVeces | t Sustraccion 3 | | t Sustraccion 3/nVeces |
| miliseg | seg |
| 10 | 10000 | 31 | 0,03100 | 0,000003100000 |
| 12 | 118 | 0,11800 | 0,000011800000 |
| 14 | 449 | 0,44900 | 0,000044900000 |
| 16 | 1760 | 1,76000 | 0,000176000000 |
| 18 | 7585 | 7,58500 | 0,000758500000 |
| 20 | 31341 | 31,34100 | 0,003134100000 |
| 22 | 122792 | 122,79200 | 0,012279200000 |
| 24 | 483473 | 483,47300 | 0,048347300000 |
| 26 | 10 | 1779 | 1,77900 | 0,177900000000 |
| 28 | 7855 | 7,85500 | 0,785500000000 |
| 30 | 31589 | 31,58900 | 3,158900000000 |
| 32 | 136999 | 136,99900 | 13,699900000000 |
| 34 | 570034 | 570,03400 | 57,003400000000 |
| 36 | 1 | 125615 | 125,61500 | 125,615000000000 |
| 38 | 515070 | 515,07000 | 515,070000000000 |
| Tarda más de 10min con nVeces=1 | | | | |

**División1**: Complejidad temporal O(n), con complejidad de la pila O(log n). La pila, por mucho que crezca n, no se desbordará.

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| --- | --- | --- | --- | --- |
| N | nVeces | t Division 1 | | t Division 1/nVeces |
| miliseg | seg |
| 100 | 10000000 | 203 | 0,20300 | 0,0000000203 |
| 200 | 223 | 0,22300 | 0,0000000223 |
| 400 | 392 | 0,39200 | 0,0000000392 |
| 800 | 687 | 0,68700 | 0,0000000687 |
| 1600 | 1105 | 1,10500 | 0,0000001105 |
| 3200 | 2145 | 2,14500 | 0,0000002145 |
| 6400 | 11072 | 11,07200 | 0,0000011072 |
| 12800 | 24897 | 24,89700 | 0,0000024897 |
| 25600 | 46795 | 46,79500 | 0,0000046795 |
| 51200 | 86772 | 86,77200 | 0,0000086772 |
| 102400 | 176060 | 176,06000 | 0,0000176060 |
| 204800 | 346665 | 346,66500 | 0,0000346665 |
| 409600 | 10000 | 213 | 0,21300 | 0,0000213000 |
| 819200 | 404 | 0,40400 | 0,0000404000 |
| 1638400 | 787 | 0,78700 | 0,0000787000 |
| 3276800 | 1523 | 1,52300 | 0,0001523000 |
| 6553600 | 5608 | 5,60800 | 0,0005608000 |

**División2**: Complejidad O(nlogn) y complejidad de la pila O(log n), por lo que por mucho que crezca n no se desbordará.

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| --- | --- | --- | --- | --- |
| N | nVeces | t Division 2 | | t Division 2/nVeces |
| miliseg | seg |
| 100 | 1000000 | 309 | 0,30900 | 0,0000003090 |
| 200 | 853 | 0,85300 | 0,0000008530 |
| 400 | 1415 | 1,41500 | 0,0000014150 |
| 800 | 9628 | 9,62800 | 0,0000096280 |
| 1600 | 19534 | 19,53400 | 0,0000195340 |
| 3200 | 41123 | 41,12300 | 0,0000411230 |
| 6400 | 27638 | 27,63800 | 0,0000276380 |
| 12800 | 70697 | 70,69700 | 0,0000706970 |
| 25600 | 259106 | 259,10600 | 0,0002591060 |
| 51200 | 1000 | 281 | 0,28100 | 0,0002810000 |
| 102400 | 376 | 0,37600 | 0,0003760000 |
| 204800 | 1086 | 1,08600 | 0,0010860000 |
| 409600 | 1511 | 1,51100 | 0,0015110000 |
| 819200 | 13045 | 13,04500 | 0,0130450000 |
| 1638400 | 19023 | 19,02300 | 0,0190230000 |
| 3276800 | 54290 | 54,29000 | 0,0542900000 |
| 6553600 | 77446 | 77,44600 | 0,0774460000 |

**División3**: Complejidad O(n) y complejidad de la pila O(log n), por lo tanto, en este caso tampoco se desbordará la pila por mucho que crezca n.

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| --- | --- | --- | --- | --- |
| N | nVeces | t Division 3 | | t Division 3/nVeces |
| miliseg | seg |
| 100 | 1000000 | 182 | 0,18200 | 0,0000001820 |
| 200 | 695 | 0,69500 | 0,0000006950 |
| 400 | 676 | 0,67600 | 0,0000006760 |
| 800 | 5834 | 5,83400 | 0,0000058340 |
| 1600 | 8233 | 8,23300 | 0,0000082330 |
| 3200 | 34660 | 34,66000 | 0,0000346600 |
| 6400 | 33077 | 33,07700 | 0,0000330770 |
| 12800 | 138107 | 138,10700 | 0,0001381070 |
| 25600 | 132573 | 132,57300 | 0,0001325730 |
| 51200 | 552728 | 552,72800 | 0,0005527280 |
| 102400 | 530238 | 530,23800 | 0,0005302380 |
| 204800 | 100 | 87 | 0,08700 | 0,0008700000 |
| 409600 | 78 | 0,07800 | 0,0007800000 |
| 819200 | 293 | 0,29300 | 0,0029300000 |
| 1638400 | 289 | 0,28900 | 0,0028900000 |
| 3276800 | 1182 | 1,18200 | 0,0118200000 |
| 6553600 | 1129 | 1,12900 | 0,0112900000 |