# 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.]

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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).

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<bk) 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 |  |