

Homework Complexity IBC028

To be handed in on the exercise session of March 2, 2018.

This is the first set of homework exercises.

By handing in these homework exercises an extra bonus can be obtained for the examination: one full point if both sets of homeworks exercise are done perfectly, and otherwise a corresponding part of one point.

Exercise 1.

Given is $T(n) = T(n/2) + T(n/3) + \Theta(n)$.

Prove that $T(n) = O(n)$ (rounding effects of $n/2$ and $n/3$ may be ignored).

Exercise 2.

Given is $T(n) = 5T(n/2) + \Theta(n^2)$.

Prove that $T(n) = O(n^2\sqrt{n})$ and $T(n) = \Omega(n^2 \log n)$.

Exercise 3.

Given is $T(n) = 2T(n-1) + \Theta(n)$.

Prove that $T(n) = O(2^{n+\log n})$.

Exercise 4.

Let $T(n) = T(n/3) + T(2n/3) + 5n$. Prove that $T(n) = O(n \log n)$.