Second Assignment

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Task 1

Prove that $O(n^2) = an^2 + bn - c$, where a - is first 2 digits of your student code, b - is 3rd and 4th digit of your student code, c - last two digits of your student code.

Code 201752IVSB, then $a = 20$, $b = 17$, $c = 52$,
equation is $O(n^2) = 20n^2 + 17n - 52$

From theory we know that $f(n) \leq c \cdot g(n)$, so we get:

$20n^2 + 17n - 52 \leq c \cdot n^2$

To simplify our equation we can choose that $c = 21$. Now let's solve this:

$20n^2 + 17n - 52 \leq 21n^2$
$20n^2 - 21n^2 + 17n - 52 \leq 0$
$-n^2 + 17n - 52 \leq 0 \mid \cdot - 1$
$n^2 - 17n + 52 \geq 0$

By taking the derivative of the quadratic formula we get:

$2n - 17 \geq 0$
$2n \geq 17$
$n = 8.5$

Meaning that the function starts to grow again after the value 8.5 is encountered.

By solving this quadratic formula equation we get the following values:

$n_1 = 13, n_2 = 4$, so $n < 4$ V $n > 13$

Meaning that the function is positive only when bigger than 4 or 13.

As a result we get — $c = 21, n = 14$