[30] Homework 6. *Programming Project*

The goal of this assignment is to understand recursive programs and analyze them.

Run the following recursion (written in a pseudo-code) for $n = 3^3, 3^9, 3^{27}$ and 3^{81}.

int **function** third (int n)
if $(n \leq 3)$
then return(1)
else return$(3 + \text{third}(\sqrt[3]{n}))$

Your job is to:

- Count the number of recursive calls in the above program (you should print this count each time you run your program for various values of n).
- Determine *theoretically* the value returned in terms of n (use big-Oh notation). In other words, construct a recurrence describing the value returned for a general n, and solve this recurrence in terms of big-Oh. Assume that $n = 3^k$ for some integer k.
- Compare printed values with the theoretical result.

Please include your program in your homework write-up.