

CS 487 – Assignment 6

Remember that the class $P = \cup_k \text{DTIME}(n^k)$, $\text{NP} = \cup_k \text{NTIME}(n^k)$ and $L = \text{DSPACE}(\log n)$.

1. For your favorite programming language, write a program that outputs its own code.
2. Let A be the language of properly nested parentheses. For example $(())$ and $((()()))()$ are in A but $)()$ is not. Show that A is in L .
3. Show that NP is closed under union, intersection and the $*$ -operation. Show the same for P .
4. Show that NP consists of exactly the set of languages L such that there is an A in P and a constant k such that

$$x \in L \Leftrightarrow \exists y, |y| = |x|^k \text{ and } (x, y) \in A.$$

Does the same result hold for some A in L ?