Section 7.2: The Class P


Basic Concepts
Define the following concepts:

(a) $P$

(b) A language $L$

The Class P

*(CLR 36.1-5)* Suppose that there exists a TM, $M$, which can accept any string, $x$, in a language $L$, but the machine $M$ runs in superpolynomial time if $x \notin L$. Argue that $L$ can be decided in polynomial time.

*(CLR Theorem 36.2)* Show that $P = \{L : L$ is accepted by a polynomial – time algorithm\}.

*(CLR 36.1-3)* Give a formal encoding of directed graphs as binary strings using an adjacency-matrix representation. Do the same thing using an adjacency-list representation. Argue that the two representations are polynomially related.

*(CLR 36.1-6)* Show that an algorithm that makes at most a constant number of calls to polynomial-time subroutines runs in polynomial time, but that making a polynomial number of calls to polynomial-time subroutines may result in an exponential-time algorithm.

*(CLR 36.1-7)* Show that the class $P$, viewed as a set of languages, is closed under union, intersection, concatenation, complement, and Kleene star.