

Lists of Algorithms

- IA Algorithm I,II
- IB Complexity
- II Randomized Algorithm

Number Theory

$n \in \mathbb{N}$

Algorithm	Input	Output	Complexity	Note
Euclid's algo	(x, y)	$?x = 1$	$O(\log x + \log y)$	in the unit of bits
Prime/Composite	$1\{0, 1\}^*$	$?Prime.$	$O(\sqrt{x})$	in the unit of bits

Boolean

Variables $X = \{x_1, x_2, \dots\}$, expression ϕ Assignment $T : X \rightarrow \mathbb{B}$,

Algorithm	Input	Output	Complexity	Note
Evaluation	ϕ, T	$?True.$	$O(n^2)$	IH rule $O(n)$ and remove one variable
SAT	ϕ	$? \exists T. T(X) = \mathbb{T}.$	$O(2^n n^2)$	$(\# T) * Eval$
VAL	ϕ	$? \forall T. T(X) = \mathbb{T}.$	$O(2^n n^2)$	$\neg \phi : not SAT$

Graph

$G : (V, E)$, Directed Acyclic Graph $DiAG$, Undirected Graph UnG .

Algorithm	Input	Output	Complexity	Note
TSP	$G, C : V \times V \rightarrow \mathbb{N}$	order for V with min Cost	$O(n!)/O(n^2 2^n)$	$\Omega(n \log n)$
Reachability	DiG, v_1, v_2	$? \exists path(a \rightarrow b).$	$O(n^2); S(n)$	marked V , neighbours
