HONORS ALGORITHMS

2024-02-21

Predicate on a set A

$$f : A \to \{0, 1\}$$

NO, YES
FALSE TRUE

1-to-1 corr. to subsets : $B \subseteq A$

$$f_B(a) = \begin{cases} 1 & \text{if } a \in B \\ 0 & \text{if } a \in A \setminus B \end{cases}$$

$$B \mapsto f_B$$

Σ finite set "alphabet"

e.g. $\Sigma = \{0, 1\}$ binary alphabet

$\rightarrow$ $\Sigma = \{ \{, \}, (,), \text{comma}, 0, 1 \}$

Graph: edge-list rep $\{\{1, 2, 3, \ldots, n\}, \{1,2\}\{2,3\}, \ldots\}$

adjacency matrix 01110 10101 . . .

n^2

$\oplus\ ((n+m) \cdot \log n)$

Σ alphabet

Σ^n : set strings of length n over Σ

words

$a_1 \cdots a_n \in \Sigma^n$ if $a_i \in \Sigma$

$$\Sigma^* = \bigcup_{n=0}^{\infty} \Sigma^n$$

all strings

empty string Λ

LANGUAGE $L \subset \Sigma^*$

PRIME $= \{$prime numbers in binary$\}$

COMPOSITE $= \{n \geq 2 \mid n$ not prime$\}$

GRAPHS

3COL $= \{$3-colorable graphs$\}$

HAM $= \{$Hamiltonian graphs$\}$

└ has Hamilton cycle (passes through every vertex)

$$\text{CLIQUE} = \{ (G,k) \mid G \text{ graph},\ k \in \mathbb{N},\ \omega(G) \geq k \}$$

clique number

G has a clique of size k

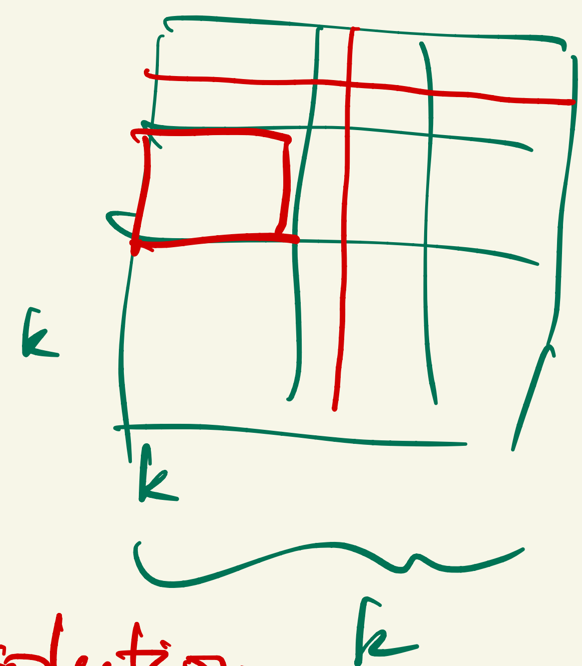
SUDOKU

entries

$0, 1, \ldots, k^2$ →

↑

blank



feasible: ∃ solution

P : set of languages recognizable in polynomial time

corresponding predicate computable in poly. time

membership testing

<u>Class</u> : set of sets

Complexity class: set of languages

P is a complexity class