XX-XXX Assignment 0

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September 14, 2024

1 Main

1.1 Theorems, Lemmas, Definitions, etc

Theorem 1.1 (Halting). The Halting Problem is undecidable.

Lemma 1.2 (Lovasz-Local Lemma). Let $A_1, \ldots, A_n$ be sequence of events, where each event A_i is dependent to at most d other events and $\mathbf{Pr}[A_i] \leq p$. Then, if $4pd \leq 1$, then there is nonzero probability that none of the events occur.

Corollary 1.3. This is a corollary

Proposition 1.4. Let $G = (V, E)$ be an undirected graph. A vertex cover of G is a subset $S \subseteq V$ such that for every edge $(u, v) \in E$, at least one of u or v is in S. The size of a minimum vertex cover of G is always at least half the size of a maximum matching in G.

Definition 1.5. A graph $G = (V, E)$ is a pair where V is a set of vertices and $E \subseteq V \times V$ is a set of edges.

Example 1.5.1. Consider the graph $G = (V, E)$ where $V = \{1, 2, 3, 4\}$ and $E = \{(1, 2), (2, 3), (3, 4), (4, 1)\}$. This graph forms a cycle of length 4.

Theorem. Every connected graph with n vertices has at least $n - 1$ edges.

Lemma. In any graph, the sum of the degrees of all vertices is equal to twice the number of edges.

Corollary. Every graph has an even number of vertices with odd degree.

Proposition. A tree with n vertices has exactly $n - 1$ edges.

Definition. A path in a graph is a sequence of vertices where each adjacent pair in the sequence is connected by an edge.

Example: This is a subexample

Example. Unumbered example

Fact. This is a fact

Claim. This is a claim

Title *tags*
This is an info card where you can put any content with a title and tags.

1.2 Operators

Pr, **E**, **Var**
poly, polylog, dist, tr, cost, proj
Short forms: ✓, $\times\epsilon, \lambda, \varphi, \otimes, \oplus, \nabla$
Number systems: $\mathbb{Z}, \mathbb{N}, \mathbb{R}$

2 TCS Style Extension

Satisfiability (SAT) Decision, NP-complete
Instance: propositional formula φ
Question: is φ satisfiable?

3 Code

3.1 Psuedocode

Algorithm 1 An algorithm with caption

$y \leftarrow 1$
$X \leftarrow x$
$N \leftarrow n$
while $N \neq 0$ **do**
  if N is even **then**
    $X \leftarrow X \times X$
    $N \leftarrow \frac{N}{2}$ ▷ This is a comment
  else if N is odd **then**
    $y \leftarrow y \times X$
    $N \leftarrow N - 1$
  end if
end while

3.2 Real code

```
class Object:
    def __init__(self, arg):
        self.arg = arg
```