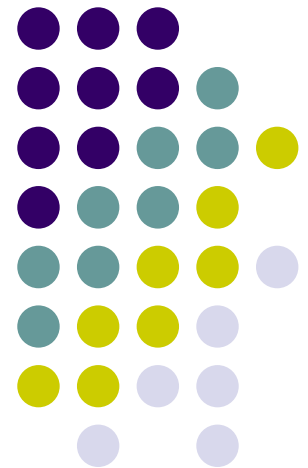


第3.5讲 - Godel Incompleteness Theorem





Kolmogorov Complexity

- $K(x)$: The length of the shortest “program” that output string “ x ” and halts.
- Theorem 1: No algorithm can decide for every binary string X and number k that if $K(X) = k$.



Godel's 1st Incompleteness Thm.

- There is no proof system that satisfies:
 - Soundness for \mathbb{N}
 - Completeness for \mathbb{N}
 - Checkable (there exist a algorithm that can tell whether a string is a legal proof or a illegal proof)



Corollaries to 1st Theorem

- Corollary 1: For every sound and checkable proof system, there is true mathematical statement that are not provable in that system.
- Corollary 2: For every proof system, there will be statements that are neither provable nor refutable in the system.

Godel's 2nd Incompleteness Thm.



- No meaningful proof system can prove its own consistency, unless it is inconsistent.