CS & IT ENGINEERING

Discussion Notes

Theory of Computation

Decidability

DPP 02





TOPICS TO BE COVERED

01 Question

02 Discussion

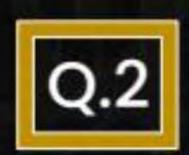


Let L = {(X) | is a DFA and L (X) is a infinite language }; where (X) represents the illustration of the deterministic finite automata (DFA).



Then which of the statement is/are correct?

- A. It is recognizable by Turing.
- B. Its complement is recognizable by Turing.
- C. It is Turing decidable (recursive).
- D. It is context-free but not regular.



Which of the following statement is/are incorrect?





If L is CFL and A is DCFL then L-A is CFL.

CFL - DCFL = CFL () DCFL => CFL () DCFL guage is always decidable

Shonell

The subset of a decidable language is always decidable.



If L and A are DCFL then $(\bar{L} \cap \bar{A})$ is CFL.

D.

None of the above are incorrect.

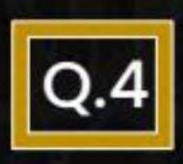


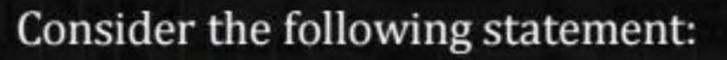
Consider some language $P \in \{0,1\}^*$ reduces to another language $Q \in \{0,1\}^*$. Which of the following statement is true? [MCQ]

PSQ



- A. P is decidable. X
- B. A Turing machine that recognizes P can be used to construct a truing that recognizes Q.
- c. If Q is decidable then P is decidable.
- D. If P is decidable then Q is decidable. χ







S₁: In phase structured language, membership problem is semi decidable.

S₂: In context-free languages, membership problem can be solved in polynomial time, $2^{1/2} O(N^3)$

- A. Only S₁ is true
- B. Only S₂ is true
- Both S₁ and S₂ is true
- D. Neither S₁ nor S₂ is true



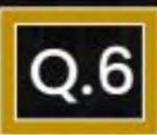
Consider the following statements:



S₁: For a decidable language X, X^R may or may not be decidable.
(X^R represents the reverse of language X).

 S_2 : If X is not recursively enumerable then \overline{X} must be recursively enumerable.

- A. Only S₁ is true
- B. Only S₂ is true
- Both S₁ & S₂ are false
 - D. Both S₁ & S₂ are true



Consider the following statements about Turing machine.





S₁: If there is some Turing machine that accepts every string in L and rejects every string not in L then L is decidable.

S₂: If there is some Turing machine that accepts every string in L and either rejects or loops on every string not in L, then L is semi-decidable or computably enumerable (CE).

- A. Only S₁ is true
- B. Only S₂ is true
- Both S₁ & S₂ are true
- D. Neither S₁ nor S₂ is true



Which of the following is/are decidable properties of contextfree?





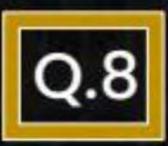
for context-free grammar X, find if string w∈X(X)

- B.
- for context-free grammar X, find if $L(X) = \phi$.
- C.

for context-free grammar X, find if L(X) is infinite.

D.

none of the above are decidable properties of context free.



Consider the following statements:



S₁: There is language for which no TM available. Then surely language will be Not RE.

S₂: Language is undecidable if and only there is no HTM available for language.

Which of the following is incorrect?

- A. S_1 only.
- B. S_2 only.
- C. Both S_1 and S_2 .
- D. Neither S₁ Nor S₂.



