Problem

Define the ***unique-sat*** problem to be

USAT = { $\langle \phi \rangle \mid \phi$ is a Boolean formula that has a single satisfying assignment}.

Show that *USAT* ? P^{SAT}.

Step-by-step solution

Step 1 of 1

Given:

$USAT = \{\langle \phi \rangle \mid \phi\}$, is basically a Boolean formula which is use for satisfying the single assignment.

Proof:

Here, it is to be proved that every Boolean formula which is satisfied has minimum one assignment which is bounded.

For proving this user need to satisfy the assignment of the *USAT* formula which is defined syntactically which the help of propositional logic.

$USAT \in P^{SAT}$

Construction:

Here, user is proving that *USAT* should have only single truth value assignment which can be proved with the help propositional logic.

• User need to define a class of bonded truth value.

• It is to be proved that formula ϕ should have minimum one assignment which is bounded. For proving this there is one assignment which is chosen that is l_ϕ which should be syntactically defined.

• Therefore, characterization of the assignment which is uniquely satisfied is $\phi \in \text{USAT}$ and it is proved by the definition which is l_ϕ.

• l_ϕ, constraint is use for satisfying all the assignment of ϕ this is because it contains information for the truth value assignment which is use for satisfying the value of ϕ.

• The assignment l_ϕ is syntactically defined with the help of propositional logic for each and every value of the variable *p*, substitution of the value p is the variable free formula.

• Here, l_ϕ is satisfying all the truth value assignment ϕ.

• l_ϕ, contains information for the truth value assignment which is use for satisfying the value of ϕ and even it help in determining the other truth value which is use for falsifying the value of ϕ.

It is proved that unique assignments in USAT are basically bounded and can be syntactically defined with the help of propositional logic.

Hence, it is proved that $USAT \in P^{SAT}$

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