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Problem 0

Points:

Acknowledgements

(a) I did not work in a group.

(b) I did not consult with anyone in my group members.

(c) I did not consult any non-class materials.

Problem 1

Points:

Algorithm 1: GREEDY-HORN

Input : set of Horn clauses
Output: either the assignment or "unsatisfiable"

```
Set all variables to 0;
while ∃ an " ⟹ " that is not satisfied do
    Set its RHS to 1;
end while
if all pure negative clauses are 1 then
    return the assignment
end if
else
    return "unsatisfiable"
end if
```

(a) According to the algorithm, first set all variables to 0 $\implies$

$$w = 0, x = 0, y = 0, z = 0$$

Now there are 5 clauses having " $\implies$ " out of which 4^{th} clause ($\implies x$) is not satified. So, we will set RHS of this clause to 1, that is, **x=1**.

This will lead to reconsidering the assignment of y because according to 3^{rd} clause ($x \implies y$), if LHS is True then RHS should be set to 1, that is, **y=1**.

This will lead to reconsidering the assignment of w because according to 5^{th} clause ($x \wedge y \implies w$), if LHS is True then RHS should be set to 1, that is, **w=1**.

This will lead to reconsidering the assignment of z because according to 1^{st} clause ($w \wedge y \wedge z \implies x$), if RHS is True then LHS should be resolved to 1, that is, **z=1**.

Now, pure negative clauses are failed to satisfy, so there is no satisfying assignment, hence algorithm will return **"unsatisfiable"**.

(b) According to the algorithm, first set all variables to 0 $\implies$

$$w = 0, x = 0, y = 0, z = 0$$

Now there are 4 clauses having " $\implies$ " out of which 4^{th} clause ($\implies z$) is not satified. So, we will set RHS of this clause to 1, that is, **z=1**.

This will lead to reconsidering the assignment of w because according to 2^{nd} clause ($z \implies w$), if LHS is True then RHS should be set to 1, that is, **w=1**.

Here, x and y need not to be changed since the implications are still satified with having **x=0, y=0**.

Now, pure negative clauses are still 1 and hence, satisfied. So, the algorithm will return the assigment

w=1, x=0, y=0, z=1

Problem 2

Points:

Problem 3

Points: