

1. Give an algorithm for deciding whether or not a given formula B in Propositional Logic is an axiom.
 2. Is $\vdash A$ decidable for every formula A in Propositional Logic? If not, is it semidecidable? Support your answer.
 3. Is $\vdash A$ decidable for every formula A in First Order Logic? If not, is it semidecidable? Support your answer.
 4. (a) Everyone who likes Alice likes Donna. Everyone who is liked by Bob is liked by Charlie. Charlie doesn't like Donna. Can you make any conclusions about whom Bob does or does not like?
(b) Can the above statements be written in Propositional Logic? If yes, do so. If not, can they be written in a first order language? If so, define (i.e., make up) an appropriate language L , and write the above in L .
 5. True or False? If every finite $\Delta \subset \Gamma$ is consistent, then Γ is consistent.
 6. Suppose L is a first order language, I an interpretation of L .
 - (a) Let A be a formula in L that has at least one free variable. Is A guaranteed to be either true or false in I ? Prove your answer. Is A guaranteed to be either true or not true in I ? Just answer Y or N without proof.
 - (b) Let B be a closed formula in L . Is B guaranteed to be either true or false in I ? Just answer Y or N without proof.
 - (c) Is it true that for every closed formula B in L , $\vdash B$ or $\vdash \neg B$? Prove your answer.
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