Middle East Technical University | Department of Computer Engineering

CENG 424

Logic For Computer Science

Fall 2024-2025

Assignment 1

Regulations

1. The homework is due by **23:55 on October 27th, 2024**. Late submission is not allowed.
2. Submissions will be via ODTUClass, do not send your homework via e-mail.
3. You typeset your homework in any typesetting tool (LaTex, Word, etc.) or submit handwritten answers. However, you must upload the homework as a single **pdf file**. Other formats will not be considered for grading. In case you submit handwritten solutions, make sure that your handwriting is clear and readable.
4. Send an e-mail to **garipler@metu.edu.tr** if you need to get in contact.
5. **This is an individual homework, which means you have to answer the questions on your own. Any contrary case including but not limited to getting help from automated tools, sharing your answers with each other, extensive collaboration etc. will be considered as cheating and university regulations about cheating will be applied.**

Question 1

Show whether the following formulae are satisfiable or not by using semantic tableaux. Clearly show each step of your solutions.

1. $\neg(p \vee r) \wedge (\neg p \Rightarrow (q \vee r)) \wedge \neg q$
2. $\neg((p \Rightarrow q) \Rightarrow \neg((p \Rightarrow t) \wedge (p \wedge t \Rightarrow q)))$

Question 2

Apply Davis-Logemann-Loveland (DLL) method to show whether the following formulae are satisfiable or not. Clearly show each step of your solutions.

1. $\neg(p \vee r) \wedge (\neg p \Rightarrow (q \vee r)) \wedge \neg q$
2. $\neg(((p \wedge q \wedge \neg w) \Rightarrow r) \Rightarrow \neg(((p \wedge r) \Rightarrow (q \vee w)) \wedge p \wedge (q \Rightarrow \neg(r \wedge w)))) \wedge (q \vee \neg r \vee \neg w)$