Middle East Technical University | Department of Computer Engineering

CENG 424

Logic For Computer Science

Fall 2024-2025

Assignment 2

Regulations

1. The homework is due by **23:55 on November 10th, 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 the page layouts are properly organized and your answers are clear and readable.**
4. Write your names and surnames to each of your pages.
5. Name your submission files as $< yourName\_yourSurname\_424HW2 >$.pdf.
6. Send an e-mail to **garipler@metu.edu.tr** if you need to get in contact.
7. **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

Using Standard Axiom Schemata (II, ID, CR, EQ, OQ), Double Negation Rule, Equivalence Elimination Rule, Modus Ponens, and the Deduction Theorem;

1. Prove $((p \Rightarrow \neg r) \Rightarrow \neg p)$ from the premises $(p \Rightarrow q)$ and $(q \Rightarrow r)$.
2. Show that $\{\neg s \vee \neg r \Rightarrow \neg t, s \Rightarrow p \vee \neg r, p \wedge s \Rightarrow q\} \vdash \{t \Rightarrow q\}$.

Question 2

Use propositional resolution to prove or disprove the following sentence:

$$(r \Rightarrow s) \wedge ((t \wedge q) \Rightarrow \neg s) \Rightarrow ((t \wedge q) \Rightarrow \neg r)$$

Question 3

Given the following passage:

"If Paul has holidays and it is snowing he will go skiing. He will go to France or Florida. There is no skiing in Florida. There is skiing in France. Paul has holidays and he will go to Florida."

1. Formalize the passage in propositional logic. Use the following propositional symbols:
   HOL: Paul has holidays.
   SNO: It is snowing.
   GSK: Paul will go skiing.
   GFL: Paul will go Florida.
   GFR: Paul will go France.
   SFL: There is skiing in Florida.
   SFR: There is skiing in France.

2. Prove that *it is not snowing* by **Resolution Refutation**. Show each step of your solution.