

CE 474-LOGIC OF COMPUTER SCIENCE

Problem Set 2

Instructions

- Read each question carefully and attempt all parts.
- Show all your work clearly. Partial credit may be awarded for correct reasoning.
- Use proper logical notation: \neg (NOT), \wedge (AND), \vee (OR), \rightarrow (IMPLIES), \leftrightarrow (IFF).
- Write your answers in a clean and legible format. Points may be deducted for poor presentation.
- This assignment is to be completed individually.

1. Translating English to Propositional Logic (4 marks)

Translate each sentence into a well-formed propositional formula. Clearly define all propositional variables you use.

- “If it rains, then the match is canceled or postponed.”
- “It is not the case that both the relationships fails and the backup is unavailable.”

2. Truth Table Construction (6 marks)

Construct the full truth table for the formula:

$$(p \vee \neg q) \rightarrow (r \wedge p)$$

Include intermediate steps: columns for p , q , r , $\neg q$, $p \vee \neg q$, $r \wedge p$, and the final column for the full formula.

3. Logical Equivalence via Truth Table (6 marks)

Show that the formulas:

$$(p \rightarrow q) \equiv (\neg q \rightarrow \neg p)$$

are logically equivalent. Provide a full truth table and compare both formulas.

4. Tautology and Contradiction (4 marks)

Give an example of each and explain why:

- A tautology
- A contradiction

Marking Tips

- Label columns and formulas clearly in truth tables.
- State and define all symbols and variables used.
- Ensure your logic is sound and presentation neat.

Academic Integrity Reminder: Do your own work. Assignments are an opportunity to deepen your understanding. Thank you!