

Lab Sheet for AI Techniques, Part 5/7**Task 1**

Using a truth table, determine whether the following formulas are tautologous, contingent, or inconsistent:

- (a) $(p \vee q) \wedge (\neg p \vee \neg q)$
- (b) $(p \rightarrow q) \rightarrow (p \wedge \neg q)$

Task 2

Which of the following are correct?

- (a) $\text{False} \models \text{True}$
- (b) $\text{True} \models \text{False}$
- (c) $(A \wedge B) \models (A \leftrightarrow B)$
- (d) $A \leftrightarrow B \models A \vee B$
- (e) $A \leftrightarrow B \models \neg A \vee B$
- (f) $(A \vee B) \wedge (\neg C \vee \neg D \vee E) \models (A \vee B \vee C) \wedge (B \wedge C \wedge D \Rightarrow E)$
- (g) $(A \vee B) \wedge (\neg C \vee \neg D \vee E) \models (A \vee B) \wedge (\neg D \vee E)$
- (h) $(A \vee B) \wedge \neg(A \Rightarrow B)$ is satisfiable.

Task 3

Convert into conjunctive normal form:

- (a) $C \wedge (A \leftrightarrow (B \vee D))$
- (b) $C \vee (\neg A \rightarrow (B \vee D))$