

## MATHEMATICAL LOGIC — ASSIGNMENT ONE

- (1) Prove in natural deduction  $\vdash \neg(A \vee B) = \neg A \wedge \neg B$ .
- (2) Show that in a bounded lattice  $\langle S; \leq \rangle$ ,  $\bigvee S = \top$  and  $\bigwedge S = \perp$ .
- (3) Show that every non-trivial Boolean algebra which is also a total order, is isomorphic to  $\langle \{0, 1\}; \leq \rangle$ , the Boolean algebra of truth-tables. Here, non-trivial means that  $\perp \neq \top$ .

Each question is worth 12 points. The points in all the four assignments will be added together and the result will be divided by 4, and this will be the final result. Remember to mark your answer sheet with your name.

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*Date:* March 24<sup>th</sup>, 2025.