

CS402 HW #1: Due Mar 15 (Thurs) 23:59.

Do NOT forget to submit both a hardcopy solution to the HW box and a softcopy solution to TA (Youngjoo Kim): jerry88.kim@gmail.com

1. Show validity and satisfiability of the following propositional formulas using both truth table and semantic tableau

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

(b) $(p \wedge q) \rightarrow (p \vee q)$

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

(d) $(p \rightarrow q) \vee (p \rightarrow \neg q)$

(e) $((p \rightarrow q) \rightarrow p) \rightarrow p$

(f) $((p \vee q) \rightarrow r) \rightarrow ((p \rightarrow r) \vee (q \rightarrow r))$

(g) $(p \rightarrow q) \rightarrow (\neg p \rightarrow \neg q).$

2. Show that **the semantic tableau method** is **sound** and **complete**. In other words, prove that A is satisfiable if and only if a semantic tableau tree of A is open. In other words, prove Theorem 2.49 (read 34-38 pg carefully)