

Exercise Sheet 5
CS 2210 Logic for Computer Scientists - Fall 2016
Solutions due: October 25, 2016 - 3:30 pm

Exercise 23 Using truth table, determine, for each of the following formulas, if it is satisfiable or not. If so, give one of its models.

(a) $(A \wedge B) \wedge (A \rightarrow \neg B)$

(b) $((B \vee C) \vee A) \wedge (\neg A \wedge \neg B)$

Exercise 24 Give a NNF, CNF, and DNF of each of the following formula:

(a) $\neg(I \vee \neg B) \vee \neg F$.

(b) $\neg((A \wedge (B \wedge D)) \vee (A \vee F))$.

Exercise 25 Give a complete tableau for the formula $(\neg p \wedge \neg q \wedge \neg r) \vee (p \wedge \neg q \wedge \neg r)$. Is the formula satisfiable or unsatisfiable?

Exercise 26 Determine if $((p \wedge q) \vee (p \wedge \neg q)) \wedge \neg(\neg r \wedge p)$ valid, satisfiable, or unsatisfiable **without** using a truth table.

Exercise 27 Show $\{A \rightarrow (B \rightarrow C)\} \models (A \rightarrow B) \rightarrow (A \rightarrow C)$ using the tableaux algorithm.

Exercise 28 Use the tableaux algorithm to determine if $\{P \leftrightarrow (Q \rightarrow R)\} \models \neg(P \vee \neg(Q \vee R))$.