Université de Fribourg
Universität Freiburg

Département de Mathématiques
Mathematik Departement

Mathematical Methods for Computer Science II

Spring 2017

Series 10 – Hand in before Monday, 08.05.2017 - 13.00

1. Apply the marking algorithm to the Horn formula below in order to determine the satisfiability of F.

$F \equiv (\neg C \vee \neg G \vee A) \wedge B \wedge \neg E \wedge (\neg A \vee D \vee \neg B) \wedge (C \vee \neg B) \wedge (\neg G \vee \neg D \vee E) \wedge (\neg C \vee G)$

Hint: do not explicit the truth table for this formula as it would require $2^6 = 64$ rows.

2. Prove that the resolvent of two Horn clauses is a Horn clause.

3. Is the following infinite set of formulas satisfiable?

$$\{\neg f_1 \vee \neg f_2, f_2 \vee f_3, \neg f_3 \vee \neg f_4, f_4 \vee f_5, \neg f_5 \vee \neg f_6, \ldots\}$$

4. a) Let F and G be satisfiable. Is $F \vee \neg G$ necessarily a tautology?
   b) Let A and $A \Rightarrow B$ be satisfiable. Is B necessarily satisfiable?
   c) Let M be any set of formulas and F a tautology. Is $M \Rightarrow F$ also a tautology ?
   d) Let G be unsatisfiable and let $F \Rightarrow G$ be a tautology. Is $F \wedge G$ satisfiable?