
Mathematical Methods for Computer Science II

Spring 2017

Series 9 – Hand in before Monday, 01.05.2017 - 13.00

1. Formalize the following statements as formulas, and then show that they are equivalent.
 - a) “If the child has temperature or has a bad cough and we reach the doctor, then we call him.”
 - b) “If the child has temperature, then we call the doctor provided we reach him, and, if we reach the doctor then we call him, if the child has a bad cough.”
2. Find a CNF and DNF for the following formulas.
 - a) $(p \Rightarrow q) \vee \neg(r \Rightarrow s)$
 - b) $(p \Rightarrow q) \Leftrightarrow \neg(r \Rightarrow s)$.

3. Find the CNF and DNF for the following formula, for instance by filling in the truth table and deducing the CNF and DNF.

$$F \equiv (A \Leftrightarrow \neg B) \vee ((\neg A \wedge C) \Rightarrow B).$$

4. Find a formula F containing the three atomic formulas A , B , and C with the following property: For every assignment $\mathcal{A} : \{A, B, C\} \rightarrow \{0, 1\}$, changing any of the values $\mathcal{A}(A)$, $\mathcal{A}(B)$, $\mathcal{A}(C)$ also changes $\mathcal{A}(F)$.
5. * Give an example of a formula which does not have an equivalent Horn formula. Why is this so?

* Exercises with a * are intended for Discrete Mathematics II students only. However, MMI II students can gain additional bonus points by attempting them.