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Complexity of Boolean functions
SS 2019
Homework 4

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Exercise 1:

Prove that each prime implicant of a monotone function $f \in M_n$ contains only nonnegated variables.

Exercise 2:

Prove Theorem 3.1 of the lecture.

Exercise 3:

Let $g = res_\beta(v)$ for a gate v in a monotone network β for the function f. Prove the following assertions:

a) g can be replaced by the constant zero iff for all $t \in PIM(g)$ for all monomials t' there holds $tt' \notin PIM(f)$.

b) g can be replaced by the constant one iff for all functions h there hold $gh \leq f$ implies $h \leq f$.

Exercise 4:

Consider Situation 2 in the proof of Theorem 3.5 of the lecture. Show that both inputs of v can be fixed at one without changing the function computed by the network β.