

GenICT Fall 2014, Module 2 (Boolean logic), HW 1

Please upload a pdf file with your solutions (legibly hand-written and scanned, or typeset documents) to <https://jgrader.de> by Monday, Oct 6, 23:59.

Problem 1 (20 pts). Express the XOR function by a Boolean formula with variables X and Y . Write the formula in a syntactically painstakingly correct way, according to the definition of the syntax of BFs.

Problem 2 (30 pts). Give a truth table for $(X \leftrightarrow (Y \leftrightarrow Z))$.

Problem 3 (50 pts). Find a Boolean formula φ with variables X, Y, Z such that for every interpretation $\mathcal{I}: \{X, Y, Z\} \rightarrow \{0, 1\}$ it holds that if \mathcal{I} is changed on any one of X, Y, Z , then $\mathcal{I}(\varphi)$ also changes. You may use other logical connectives besides NOT, AND, OR to specify your formula. *Hint:* you will be guided toward the solution if you first consider the easier case of only two Boolean variables.