

CS-472: Design Technologies for Integrated Systems

Exercise Problem Set 8

Date: 31/10/2024

Topics: Binary Decision Diagrams (cf. slide set 10)

Problem 1

A Boolean function $f(x, y, z)$ is given as the following truth table.

x	y	z	f
0	0	0	1
0	0	1	1
0	1	0	0
0	1	1	0
1	0	0	0
1	0	1	1
1	1	0	0
1	1	1	1

- (a) Draw the complete, **non-reduced** BDD with the variable order $x < y < z$.
- (b) Apply the reduction rules.
- (c) Derive a SOP from the BDD.
- (d) Transform the BDD to use complemented edges.

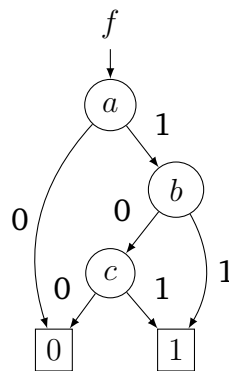
Problem 2

Consider the functions $f = ab + bc$ and $g = ac$.

- (a) Draw the BDDs (reduced and ordered) for f , g and $\bar{g}$ (select a variable order that minimizes the BDDs).
- (b) Use the ITE operator to compute $f \oplus g$ and draw the BDD of $f \oplus g$.

Problem 3

Given the following zero-suppressed BDD (ZDD):



- (a) Write down the item set represented by the ZDD.
- (b) Give an SOP of the characteristic function f . (Verify f with the item set!)