Week 8--Assignment

The due date for submitting this assignment has passed. Due on 2016-09-18, 23:58 IST.

Submitted assignment

1) Let \( B_X \) and \( B_Y \) are two ROBDDs representing Boolean function \( f(a,b,c)=a'b+ac+bc' \) with variable ordering \(<a, b, c>\) and \(<c, a, b>\) respectively. Count the number of nodes in \( B_X \) and \( B_Y \).

\[
\begin{align*}
B_X &= 5, \quad B_Y = 5 \\
B_X &= 5, \quad B_Y = 6 \\
B_X &= 6, \quad B_Y = 5 \\
B_X &= 6, \quad B_Y = 6
\end{align*}
\]

No, the answer is incorrect.
Score: 0
Accepted Answers:
\( B_X = 6, \quad B_Y = 5 \)

2) Consider the Boolean function of 2-bit comparator, \( f(a_1,a_2,b_1,b_2) = (a_1 \text{XNOR} b_1) \cdot (a_2 \text{XNOR} b_2) \). Draw ROBDD to represent \( f \) with variable ordering \(< a_1, a_2, b_1, b_2>\) and find the number of nodes in it.

\[
\begin{align*}
&10 \\
&11 \\
&12 \\
&14
\end{align*}
\]

No, the answer is incorrect.
Score: 0
Accepted Answers:
11

3) Let \( f(a,b)=a'b+a'b+ab+ab'ab \) be a Boolean function. Which of the followings is true?

- \( f \) is independent of only \( a \)
- \( f \) is independent of only \( b \)
- \( f \) is independent of both \( a \) and \( b \)
- None of the above

No, the answer is incorrect.
Score: 0
4) Let \( f(a,b,c)=a'b' \cdot abc + a'c \) be a Boolean function. What is the negative Shannon cofactor of \( f \) with respect to \( c \)?

- \( a' \)
- \( b' \)
- \( c' \)
- \( a'b'+ab \)

No, the answer is incorrect.
Score: 0

5) Let \( B_f \) be a ROBDD of Boolean expression \( f \). If \( B_f \) contains only one node and that is labeled with 1, then which of the followings is true for \( f \)?

- \( f \) is not a valid Boolean expression
- \( f \) is not a satisfiable Boolean expression
- \( f \) is a valid Boolean expression
- None of the above

No, the answer is incorrect.
Score: 0

6) Let \( B_f \) be a ROBDD of a Boolean expression \( f \). If there exists 4 paths to terminal node 1 and 3 paths to terminal node 0 in \( B_f \), then what can we say about \( f \)?

- \( f \) is valid but not satisfiable
- \( f \) is valid and satisfiable
- \( f \) is neither valid nor satisfiable
- \( f \) is not valid but satisfiable

No, the answer is incorrect.
Score: 0

7) Let \( B_f \) be a OBDD representing Boolean function \( f(a,b,c)=a'b+b'c \) and \( B_g \) be another OBDD representing Boolean function \( g(a,b,c)=a'b \). Perform XOR operation on \( B_f \) and \( B_g \) (i.e., \( B_{\text{XOR}} = B_f \oplus B_g \)) and reduce it. Find the number of nodes and number of satisfying assignments in \( B_{\text{XOR}} \). Assume order of variables in all cases is \( <a, b, c> \).

- Nodes=4, Satisfying assignments =2
- Nodes=6, Satisfying assignments =2
- Nodes=8, Satisfying assignments =3
- Nodes=6, Satisfying assignments =3

No, the answer is incorrect.
Score: 0

8) Consider the Boolean function \( f(a,b,c,d)= ab'c + ab + c'd + bcd \). Construct ROBDD, \( B_f \), to represent \( f \). Construct ROBDDs \( B_X \) and \( B_Y \) to represent \( \text{restrict}(0,c, B_f) \) and \( \text{restrict}(1,c,B_f) \), respectively. Finally, construct ROBDD, \( B_Z \), to represent \( \text{exists}(c, B_f) \) using \( B_X \) and \( B_Y \). Find the number of nodes in \( B_f \), \( B_X \), \( B_Y \) and \( B_Z \). Assume order of variables in all cases is \( <a, b, c, d> \).

Nodes=4, Satisfying assignments =2

Nodes=4, Satisfying assignments =2
9) Let \( f(x, y) = x(y + x') \) be a Boolean function. Find the restrictions of \( f \) with respect to \( x \).

- \( 0, xy \)
- \( x', xy \)
- \( 0, y \)
- \( x', x+y \)

No, the answer is incorrect.
Score: 0
Accepted Answers:
\( 0, y \)