
Name:**Entry No.:**

1. **[2+2 = 4 marks]** A student wishes to find a satisfying assignment for the propositional logic formula $\phi = \phi_1 \wedge \phi_2$, where ϕ_1 is a Horn formula and ϕ_2 is a CNF formula that is not a Horn formula. Formulae ϕ_1 and ϕ_2 have some common propositional variables between them. The student proposes to proceed in two different ways to solve this problem:
- (a) A satisfying assignment for ϕ_1 is obtained using the method for satisfiability checking of Horn formulae discussed in class (i.e., determine which propositional variables must be set to *true* because of implications, and then set all the remaining variables to *false*). Formula ϕ_2 is then simplified using the variable assignments thus found, and the assignments for remaining variables, if any, are obtained by applying the DPLL procedure on the simplified formula.
 - (b) A satisfying assignment for ϕ_2 is obtained by applying the DPLL procedure. Formula ϕ_1 is then simplified using the variable assignments thus found. The assignments for remaining variables, if any, are obtained by applying the method for satisfiability checking of Horn formulae discussed in class on the simplified formula.

For each of the above approaches, determine whether it is guaranteed to give a satisfying assignment for ϕ for arbitrary Horn formula ϕ_1 and non-Horn CNF formula ϕ_2 . If you think a particular approach will always lead to the correct answer, you must give justification (reasons) for the same. Else, you must give a counterexample to show that the approach may not lead to the correct answer.