

1. Explain the terms conjunctive normal form and disjunctive normal form.
2. Convert the following expressions to Conjunctive Normal Form.
 - (a) $a \vee b$
 - (b) $a \wedge b$
 - (c) $((a \wedge b) \vee (\neg b \wedge c)) \vee \neg d$
 - (d) $(a \wedge b) \vee (c \wedge d)$
 - (e) $(a \vee b) \wedge (c \vee d)$
3. Convert the following expressions to Disjunctive Normal Form.
 - (a) $a \vee b$
 - (b) $a \wedge b$
 - (c) $((a \wedge b) \vee (\neg b \wedge c)) \vee \neg d$
 - (d) $(a \wedge b) \vee (c \wedge d)$
 - (e) $(a \vee b) \wedge (c \vee d)$
4. Determine if there is a setting of the variables in the following expression that makes the evaluation of the expression true.
 - (a) $a \vee b$
 - (b) $a \wedge b$
 - (c) $((a \wedge b) \vee (\neg b \wedge c)) \vee \neg d$
 - (d) $(a \wedge b) \vee (c \wedge d)$
 - (e) $(a \vee b) \wedge (c \vee d)$
5. Explain the SAT problem.
6. Explain the 3-SAT problem.
7. Explain how to prove that a problem is NP-complete.
8. Prove that 3-SAT is NP-complete. You may assume that SAT is NP-complete.