

CISC404/604 homework assignment 7.

1. (10 pts) Do Exercise 29, page 32 in Schoning book.
2. (10 pts) Do Exercise 33, page 36 in Schoning book.
3. (10 pts) Do Exercise 34, page 36 in Schoning book.
4. (10 pts) Do Exercise 39, page 39 in Schoning book.
5. (10 pts) Prove that $((p \Rightarrow r) \wedge (q \Rightarrow r)) \Rightarrow ((p \vee q) \Rightarrow r)$ is valid by negating it, converting the negated formula into Conjunctive Normal Form (CNF), converting that formula into clauses, and then deriving the empty clause. Show all your work.
6. (10 pts) Prove that $((p \Rightarrow q) \wedge (q \Rightarrow r)) \Rightarrow (\neg r \Rightarrow \neg p)$ is valid by negating it, converting the negated formula into Conjunctive Normal Form (CNF), converting that formula into clauses, and then deriving the empty clause. Show all your work.
7. (10 pts) Prove that the set of clauses $\{\{\neg q, r\}, \{q, r\}, \{\neg s, r\}, \{s, \neg r\}, \{\neg s, \neg r\}\}$ is unsatisfiable by deriving the empty clause from it. Show all your work.