Discrete Mathematics
Drill-1

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1 Drill 2

1.1 logic

For each of the following propositions construct an equivalent proposition that uses only the nand (|) binary operator:

1. $(\neg p \leftrightarrow \neg q) \leftrightarrow (p \leftrightarrow q)$
2. $((p \rightarrow q) \rightarrow r) \rightarrow s$
3. $(p \leftrightarrow q) \leftrightarrow (r \leftrightarrow s)$

1. A truth table of a boolean function with five variables p_1, p_2, p_3, p_4, p_5 is false only when $p_1 = p_3 = p_5 = F$ or $p_2 = p_4 = F$ or $p_3 = p_4 = F$.

Construct a conjunction of disjunction for this function.

2.* a. Show that $(p \vee q \vee r) \wedge (p \vee q \vee \neg r) \wedge (p \vee \neg q \vee r) \wedge (\neg p \vee q \vee r) \wedge (\neg p \vee \neg q \vee r) \wedge (\neg p \vee q \vee \neg r) \wedge (\neg p \vee \neg q \vee r) \wedge (p \vee \neg q \vee r)$ is not satisfiable but if you delete any clause ($(x \vee y \vee z) is a clause) then the remaining 7 cluases are satisfiable.$

3.** Construct an example of a 3-SAT instance with 10 clauses which is not satisfiable but if you delete any clause it will be satsifiable.