CSI2101 PRACTICE EXERCISES - PROPOSITIONAL LOGIC

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For each propositional formula (also called *compound proposition* in Rosen textbook) below, solve the following exercises:

(1) Write its truth table.
(2) Write an equivalent formula in disjunctive normal form (DNF), i.e. *disjunction (= or's)* of *terms (=conjunctions of literals)*.
(3) Write an equivalent formula in conjunctive normal form (CNF), i.e. *conjunction(=and's)* of *clauses (=disjunctions of literals)*.
(4) Write an equivalent formula that only uses connectives in $\{\wedge, \neg\}$.
(5) Write an equivalent formula that only uses connectives in $\{\vee, \neg\}$.
(6) Construct logic gates (and-gate, or-gate, inverter) that computes a boolean function represented by each of the above propositions.
(7) Prove that the original formula is logically equivalent to the DNF (CNF) one by using logical equivalences.

Some formulas for you to practice:

- $(p \vee q) \rightarrow (p \oplus q)$
- $(x \vee y) \rightarrow (\neg x \wedge z)$
- $(p \leftrightarrow q) \oplus (\neg p \leftrightarrow q)$
- Choose others from the textbook...