Tutorial 2 _2022-23

1. Construct Truth table for the following
   Make a truth table for the following:
   a. $(p \vee q) \wedge r$
   b. $(p \vee \sim q) \rightarrow r$
2. Is ((p∨~q) ∧(~p∨~q)) ∨q a tautology? Hint: Either solve by substitution method or by truth table.
3. Prove the following:
   a. p ∨ (~p ∧ q) ≡ (p∨q), Hint: solve by truth table or substitution method
   b. p ∧ (~p∨q) ≡ (p ∧ q)
4. Construct the truth tables for following:

$(a)\quad p \rightarrow p$

$(b)\quad (p \rightarrow p) \vee (p \rightarrow \bar{p})$

$(c)\quad (p \rightarrow p) \rightarrow (p \rightarrow \bar{p})$

$(d)\quad (p \vee \bar{q}) \vee \bar{p}$

$(e)\quad (p \vee \bar{q}) \rightarrow \bar{p}$

$(f)\quad p \leftrightarrow (\bar{p} \vee \bar{q})$

$(g)\quad (p \rightarrow (q \rightarrow r)) \rightarrow ((p \rightarrow q) \rightarrow (p \rightarrow r))$

$(h)\quad (\bar{q} \rightarrow \bar{p}) \rightarrow (p \rightarrow q)$

5. Let P denote the statement "Weather is nice" and Q denotes "We have a picnic". Translate the following symbolic statements in English statements.

$(a)\quad p \wedge \bar{q}$

$(b)\quad p \leftrightarrow q$

$(c)\quad \bar{q} \rightarrow \bar{p}$

$(d)\quad \overline{(\bar{p} \vee q)} \vee (p \wedge \bar{q})$

6. Consider the following conditional statement:
   If the flood destroy my house or the fires destroy my house, then my insurance company will pay me.
   Write the converse, inverse and contrapositive of the statement.