Assignment -02

1. **Show that the following statements are logically equivalent without using truth tables.**

(*p* → *r*) ˅ (*q* → *r*) and (p ^ q) → r

$p \to q$ and $\neg q \to \neg p$

$(p \to q) \wedge (p \to r)$ and $p \to (q \wedge r)$

$(p \to r) \wedge (q \to r)$ and $(p \vee q) \to r$

$\neg p \to (q \to r)$ and $q \to (p \vee r)$

$(p \wedge \neg q) \vee q$ and $p \vee q$

2. Constructing new logical equivalences show the following

$p \to p \vee q$ is a tautology

$(p \wedge q) \to p$ is a tautology

$[(p \wedge \neg(\neg p \vee q)) \vee (p \wedge q)] \to p$ is a tautology.