

Math 1090 A Homework 1 due September 20 at Noon

1. (a) Determine whether $(p \Rightarrow q) \Rightarrow p$ logically implies p .
(b) Is $((p \Rightarrow q) \Rightarrow p) \Rightarrow p$ a tautology? Justify.
(c) Explain the relation between the question in (a) and that in (b)?
2. (a) Determine whether $(p \equiv q) \equiv r$ and $p \equiv (q \equiv r)$ are equivalent.
(b) On the basis of your answer to (a) a particular (boolean) expression is a tautology. What expression is that?
3. (a) Use truth tables to show that each of $p \vee (p \wedge q)$ and $p \wedge (p \vee q)$ are equivalent to p .
(b) Is $p \vee (p \wedge q) \equiv p \equiv p \wedge (p \vee q)$ a tautology? Justify.
4. (a) Determine whether $(p \vee q) \Rightarrow r$ and $p \vee (q \Rightarrow r)$ are equivalent.
(b) Determine whether $(p \vee q) \vee r$ and $p \vee (q \vee r)$ are equivalent.
(c) Determine whether $(p \Rightarrow q) \Rightarrow r$ and $p \Rightarrow (q \Rightarrow r)$ are equivalent.