

MATH 55 - WORKSHEET 1 (TUESDAY)

1 Verify that $\neg(p \vee q) \equiv \neg p \wedge \neg q$.

2 Show the following conditional statements are a tautology using truth tables:

a $[\neg p \wedge (p \vee q)] \rightarrow q$

b $[(p \rightarrow q) \wedge (q \rightarrow r)] \rightarrow (p \rightarrow r)$

c $[p \wedge (p \rightarrow q)] \rightarrow q$

d $[(p \vee q) \wedge (p \rightarrow r) \wedge (q \rightarrow r)] \rightarrow r$

3 Show that $\neg(p \leftrightarrow q) \equiv \neg p \leftrightarrow q$ are logically equivalent.

4 Find a compound proposition involving the propositional variables p , q , and r that is true when exactly two of p , q , and r are true and is false otherwise

5 Let $P(x)$ be the statement " $x = x^2$ ". If the domain consists of integers, what are the truth values of the following?

a $P(0)$

b $P(1)$

c $P(2)$

d $P(-1)$

e $\exists xP(x)$

f $\forall xP(x)$

6 Show that $\forall xP(x) \vee \forall xQ(x)$ and $\forall x(P(x) \vee Q(x))$ are not logically equivalent.