MAT2440, Classwork7, Spring2025

ID:_____ Name:_____

1. Use identities to prove ‘‘$\neg (p \rightarrow q) \equiv p \wedge \neg q$’’

~~$\neg(p \rightarrow q) \equiv p \wedge (\neg q)$~~

$\neg(p \rightarrow q) \equiv \neg(\neg p \vee q)$ first one in Group II

$\equiv \neg(\neg p) \wedge \neg q$ De Morgan's law

$\equiv p \wedge (\neg q)$ Double Negation

2. Use identities to prove ‘‘$(p \wedge q) \rightarrow (p \vee q)$’’ is a tautology.

$(p \wedge q) \rightarrow (p \vee q) \equiv \neg(p \wedge q) \vee (p \vee q)$

$\equiv (\neg p \vee \neg q) \vee (p \vee q)$ De Morgan's

$\equiv (\neg p \vee p) \vee (\neg q \vee q)$ associative and commutive

$\equiv T \vee T$ negation

$\equiv T$ domination

3. Group III of the logically equivalences: Identities related to biconditional statements.

$p \leftrightarrow q \equiv$

$p \leftrightarrow q \equiv$

$p \leftrightarrow q \equiv$

$\neg(p \leftrightarrow q) \equiv$

4. Predicate logic and Propositional function:

   The _____ _____ allows variables in propositions and enables us to reason and explore relationships between objects. A _____ _____ is a statement with variables and has been used on predicate logic. Once the values have been assigned to the variables, the propositional function becomes a _____.

5. Let $P(x)$ denote the statement ‘‘$x > 3$’’. What are the truth values of $P(2)$ and $P(4)$.

6. Let $Q(x, y)$ denote the statement ‘‘$x = y + 3$’’. What are the truth values of the propositions $Q(1,2)$ and $Q(3,0)$.

7. Given a computer programing ‘‘If $x > 0$, then $x := x + 1$’’. Using the terminology of propositional function to explain it.