Definition 1. *Compound propositions are made of primitive propositions.*

Definition 2. *Logic connectives and their symbols are*

negation	*not*	$\neg$
conjunction	*and*	$\wedge$
disjunction	*or*	$\vee$
exclusive OR	*either...or...*	$\oplus$
implication	*if...then...*	$\rightarrow$
equivalent	*if and only if*	$\leftrightarrow$

p	$\neg p$
0	*1*
1	*0*

p	q	$p \wedge q$
1	*0*	*0*
1	*1*	*1*
0	*0*	*0*
0	*1*	*0*

p	q	$p \vee q$
1	*0*	*1*
1	*1*	*1*
0	*0*	*0*
0	*1*	*1*

p	q	$q \oplus q$
1	*0*	*1*
1	*1*	*0*
0	*0*	*0*
0	*1*	*1*

p	q	$p \rightarrow q$
1	*0*	*0*
1	*1*	*1*
0	*0*	*1*
0	*1*	*1*

p	q	$p \leftrightarrow q$
1	*0*	*0*
1	*1*	*1*
0	*0*	*0*
0	*1*	*0*

Definition 3. *Two statements are logically equivalent to each other if they have the same truth table.*

Theorem 1. ***Law of substitution****: If two statements are logically equivalent, one can substitute the other.*

Definition 4. *Logic substitution rules*

Commtative	$p \wedge q \Leftrightarrow q \wedge p$	$p \vee q \Leftrightarrow q \vee p$
Associative	$(p \wedge q) \wedge r \Leftrightarrow q \wedge (p \wedge r)$	$(p \vee q) \vee r \Leftrightarrow q \vee (p \vee r)$
Distributive	$p \wedge (q \vee r) \Leftrightarrow (p \wedge q) \vee (p \wedge r)$	$p \vee (q \wedge r) \Leftrightarrow (p \vee q) \wedge (p \vee r)$
Identity	$p \wedge T \Leftrightarrow p$	$p \vee F \Leftrightarrow p$
Negation	$p \vee \neg p \Leftrightarrow T$	$p \wedge \neg p \Leftrightarrow F$
Double Negation	$\neg(\neg p) \Leftrightarrow p$	
Idempotent	$p \wedge p \Leftrightarrow p$	$p \vee p \Leftrightarrow p$
Universal Bound	$p \vee T \Leftrightarrow T$	$p \wedge F \Leftrightarrow F$
De Morgan's	$\neg(p \wedge q) \Leftrightarrow (\neg p) \vee (\neg q)$	$\neg(p \vee q) \Leftrightarrow (\neg p) \wedge (\neg q)$
Absorption	$p \vee (p \wedge q) \Leftrightarrow p$	$p \wedge (p \vee q) \Leftrightarrow p$
Conditional	$(p \rightarrow q) \Leftrightarrow (\neg p \vee q)$	$\neg(p \rightarrow q) \Leftrightarrow (p \wedge \neg q)$