Tutorial Sheet Week 2

2. a) $(\sim p \lor q) \land q$ and $(\sim p \land q) \lor q$

TRUTH TABLE 1 : $(\sim p \lor q) \land q$

p	q	$\sim p$	$\sim p \lor q$	$(\sim p \lor q) \land q$
T	T	F	T	T
T	F	F	F	F
F	T	T	T	T
F	F	T	T	F

TRUTH TABLE 2. $(\sim p \land q) \lor q$

p	q	$\sim p$	$\sim p \land q$	$(\sim p \land q) \lor q$
T	T	F	F	T
T	F	F	F	F
F	T	T	T	T
F	F	T	T	F

We notice that the two given statements share the same results with corresponding cases for p and q.
~~But it in other way.~~
→ Therefore, we can denote the following

$$(\sim p \lor q) \land q \equiv (\sim p \land q) \lor q$$

We hypothesise that we can interchange $\lor$ and $\land$ in a statement without affecting the truth table

b) $(\sim p \lor q) \land p$ AND $(\sim p \land q) \lor p$
TRUTH TABLE 1: $(\sim p \lor q) \land p$

p	q	~p	~p ∨ q	(~p ∨ q) ∧ p
T	T	F	T	T
T	F	F	F	F
F	T	T	T	F
F	F	T	T	F

TRUTH TABLE 2: $(\sim p \land q) \lor p$

p	q	~p	~p ∧ q	(~p ∧ q) ∨ p
T	T	F	F	T
T	F	F	F	T
F	T	T	T	T
F	F	T	F	F

These two statements don't share the same results.
We hypothesise that we can NOT interchange $\land$ and $\lor$ in a statement without affecting the truth table

NOTICE: If the position of the logical is in the following
    (i) $\lor$ and $\land$ → CAN INTERCHANGE
    (ii) $\land$ and $\lor$ → ~~CAN~~ CANNOT INTERCHANGE