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Task 2:

(a) Write truth tables for  $(\sim p \vee q) \wedge q$  and  $(\sim p \wedge q) \vee q$ . What do you notice? Based on this result, we hypothesise that we can interchange  $\vee$  and  $\wedge$  in a statement without affecting the truth table.

p	q	$\sim p$	$\sim p \vee q$	$(\sim p \vee q) \wedge q$
T	T	F	T	T
T	F	F	F	F
F	F	T	T	F
F	T	T	T	T

p	q	$\sim p$	$\sim p \wedge q$	$(\sim p \wedge q) \vee q$
T	T	F	F	T
T	F	F	F	F
F	F	T	F	F
F	T	T	T	T

➔ Both statements have the same truth values in every row of their respective truth tables.

(b) Write truth tables for  $(\sim p \vee q) \wedge p$  and  $(\sim p \wedge q) \vee p$ . What do you think of the hypothesis now?

p	q	$\sim p$	$\sim p \vee q$	$(\sim p \vee q) \wedge p$
T	T	F	T	T
T	F	F	F	F
F	F	T	T	F
F	T	T	T	F

p	q	$\sim p$	$\sim p \wedge q$	$(\sim p \wedge q) \vee p$
T	T	F	F	T
T	F	F	F	T
F	F	T	F	F
F	T	T	T	T

➔ The truth tables for the two statements are different.

➔ The hypothesis that we can interchange  $\vee$  and  $\wedge$  in a statement without affecting the truth table does not hold true for these specific statements.