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#28 (a) $(p \to q)$ Converse $q \to p$

"If I stay home it will snow tonight"

$p \to q$ Contrapositive $\sim q \to \sim p$

"If I do not stay home then it will not snow tonight"

$p \to q$ Inverse $\sim p \to \sim q$

"if it does not snow tonight then I will stay home"

(b) Converse

"Whenever I go to the beach its a sunny summer day"

Contrapositive

"whenever I don't go to the beach its not a sunny summer day"

Inverse

"whenever it is not a sunny day I do not go to the beach"

(c) Converse

"If I sleep until noon, then I stayed up late"

Contrapositive

"If do not sleep until noon then I did not stay up late"

Inverse

"If I don't stay up late then I don't sleep until noon"

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(a)

p	q	r	(p v q)	p v q v r
T	T	T	T	T
T	F	T	T	T
F	T	T	T	T
F	F	T	F	T
T	T	F	T	T
T	F	F	T	T
F	T	F	T	T
F	F	F	F	F

(b)

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

(c)

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

(d)

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

(e)

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

(f)

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