$(p \vee q) \vee r \equiv p \vee (q \vee r)$???

Truth Table

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

By truth table,

$(p \vee q) \vee r \equiv p \vee (q \vee r)$

$\Rightarrow$ "$\vee$" is associative.

$\longrightarrow$ $p \vee q \wedge r$??

$(p \vee q) \wedge r$ $\quad$ $p \vee (q \wedge r)$

Distributive law :-

i) $p \wedge (q \vee r) = (p \wedge q) \vee (p \wedge r)$

ii) $p \vee (q \wedge r) = (p \vee q) \wedge (p \vee r)$

Can be proved by using Truth table.

calculate by $(p \wedge r)$ and $(p \wedge r)$ then $(p \wedge r) \vee (p \wedge r)$

7)

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

By truth table,

$$p \wedge (q \vee r) \equiv (p \wedge q) \vee (p \wedge r)$$

Converse :

$p \Rightarrow q$ $\qquad$ $q \Rightarrow p$

Inverse :

$p \Rightarrow q$ $\qquad$ $\sim p \Rightarrow \sim q$

contrapositive

$p \Rightarrow q$ $\qquad$ $\sim p \Rightarrow \sim q$