

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

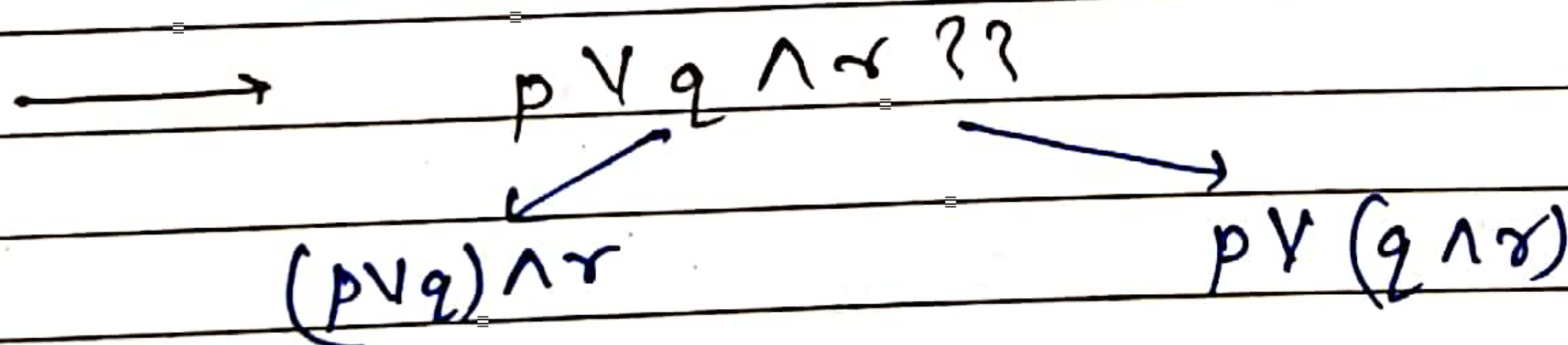
Truth Table

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,

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

→ "∨" is associative.



# 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  $(p \wedge r)$   
 $\rightarrow$  then  $(p \wedge r) \vee (p \wedge r)$

1)	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
	T	T	T	T	F	T
	T	T	F	T	F	T
	T	F	T	T	F	T
	F	F	F	F	F	F

By truth table,

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

# Converse:

$$p \Rightarrow q$$

$$q \Rightarrow p$$

# Inverse:

$$p \Rightarrow q$$

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

# Contrapositive

$$p \Rightarrow q$$

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