

lec #3:- Implication. $P \rightarrow Q$

Converse:- $Q \rightarrow P$

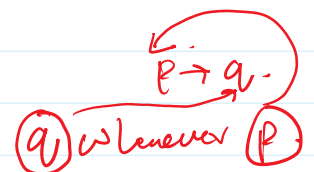
Contrapositive:- $\neg Q \rightarrow \neg P$

Inverse:- $\neg P \rightarrow \neg Q$.

Ex 9:- Find Contrapositive, Inverse & Converse of.
PB.

(the home team wins) whenever (it is raining).
 \rightarrow

Let P = the home team wins.
 Q = it is raining.



\Rightarrow P whenever Q .
 $Q \rightarrow P$.

Contrapositive $\neg P \rightarrow \neg Q$.

if the home team does not win then it is not raining.

Converse:- H.W.

Inverse:- H.W.

"Session 1"

Bi-Conditional:-
 \leftrightarrow

P	Q	$P \leftrightarrow Q$
T	T	T
T	F	F
F	T	F
F	F	T

T	F	F
F	T	F
F	F	T

"You can take flight iff you buy Air ticket".

P Q

P is necessary & Sufficient for Q .

(Suff) (Nec)

if P then Q & Conversely.

$P \rightarrow Q$

Compound Propositions.

$$(P \vee \neg Q) \rightarrow (P \wedge Q)$$

Precedence.

P	Q	$\neg Q$	$P \vee \neg Q$	$P \wedge Q$	$(P \vee \neg Q) \rightarrow (P \wedge Q)$
T	T	F	T	T	T
T	F	T	T	F	F
F	T	F	F	F	T
F	F	T	T	F	F

\neg
 \wedge
 \vee
 \rightarrow
 \leftrightarrow

Applications of Propositional Logic.

- 1- System Specification.
- 2- Puzzles.
- 3- Searching.

System Specification:-

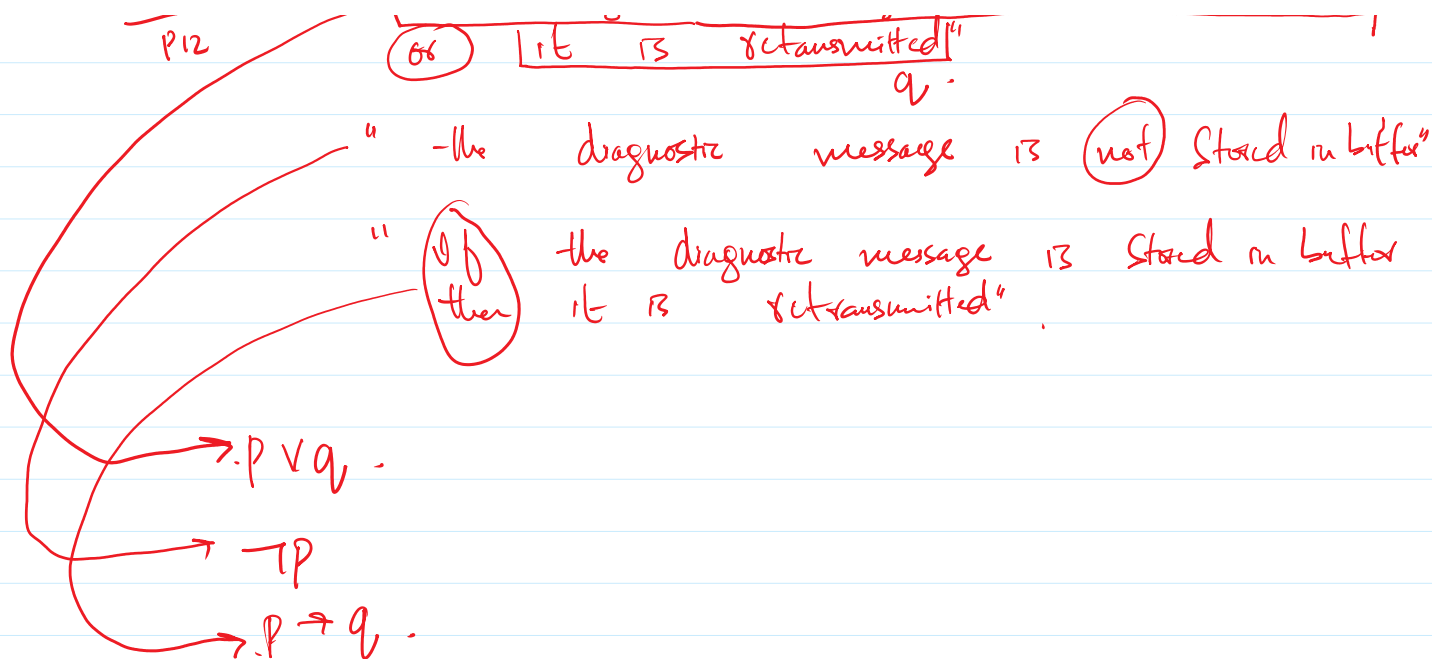
P .

Q .

Ex 15 :-
 $P12$

The diagnostic message is stored in buffer
 or it is retransmitted

Q .



$$P \vee q = T \quad \text{--- (1) X.}$$

$$\neg P = T \quad \text{--- (2) X.}$$

$$P \rightarrow q = T \quad \text{--- (3)}$$

$$P \rightarrow T = T \quad \text{--- (4) V.}$$

From (2) we have $P = F$ --- (4) X.

From (4) & (1) we have $q = T$ --- (5)

from 5 & 3 it holds.

P	q	$P \vee q$
T	T	T
T	F	T
F	T	T
F	F	F

X.

P	$\neg P$
T	F
F	T

P	q	$P \rightarrow q$
T	T	T
T	F	F
F	T	T
F	F	T

X.

P	q	$P \vee q$
T	T	T
T	F	T
F	T	T
F	F	F

→

Ex 16. "The diagnostic message is stored in buffer"

Ex 16. "The diagnostic message is stored in buffer
 or it is retransmitted"
 q .

"the diagnostic message is not stored in buffer"

"if the diagnostic message is stored in buffer
 then it is retransmitted".

"the diagnostic message is not retransmitted".

$$p \vee q = T \quad - (1)$$

$$\neg p = T \quad - (2) \times$$

$$p \rightarrow q = T \quad - (3)$$

$$\neg q = T \quad - (4) \times$$

from (2) $p = F \quad - (5)$

from (4) $q = F \quad - (6)$

from 5, 6 & (1) $p \vee p \neq T$.

HW P 26 Ex 49-55

Quiz # 1

29-08-2023.

the glasses are on the coffee table or it is inside
 desk.

the glasses are not on the coffee table-

if the glasses are on the coffee table then it

is inside the desk.

The glasses are inside the desk.

Where are the glasses?