Monday, 22 May 2023 2:05 pm

lec # 3:- Implication. $p \to q$

Converse: $q \to p$

Inverse: $\neg p \to \neg q$

Contrapositive. $\neg q \to \neg p$.

Eg:- "the hometeam (p) wins whenever it is raining (q)".

Let p: the hometeam wins.
q: It is raining.

$q \to p$.

Converse: $p \to q$:- if the hometeam wins then it is raining.
Inverse: $\neg q \to \neg p$:- if it is not raining then hometeam do not win.
Contrapositive: $\neg p \to \neg q$: - - - - - HW.

Question 1 Session.

Double Implication. $\leftrightarrow$

p	q	$p \leftrightarrow q$
T	T	T
T	F	F
F	T	F
F	F	T

1) iff.
2) p is necessary & sufficient for q. (is is)
3) if p then q & Conversely.

"You can take the flight (p) iff ($\leftrightarrow$) you buy an air ticket (q)".

p ⟷ q.

Precedence.

$(p \vee \neg q) \rightarrow (p \wedge q)$.

1) ¬
2) ∧
3) ∨
4) →
5) ↔

p	q	¬q	p∨¬q	p∧q	(p∨¬q)→(p∧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

Application of Propositional logic.

1- System Specification.
2- logic puzzles.
3- Searching.

System Specification.

Contradiction.

Exis p12:-

① "the diagnostic msg is stored in buffer (or) it is retransmitted". p ∨ q.

② "the diagnostic msg is not stored in buffer".

③ "If the diagnostic msg is stored in the buffer then it is retransmitted".

① $p \vee q = T$ x.

② $\neg p = T$ X

③ $p \rightarrow q = T$ x

p	q	p∨q
T	T	T
T	F	T
→ F	T	T
F	F	F.

from ② p = F ④ X

from ④ & ① q = T ⑤

p	¬p
T	F

from (2) $p = F$ (4) ∧

from (4) & (1) $q = T$ (5)

from (3) put (4) & (5)

p	¬p
T	F
F	T ←

$F \to T = T$.

Holds.

p	q	$p \to q$
T	T	T
~~T~~	~~F~~	~~F~~
F	T	T
F	F	T

Ex 6 / P12 :- " The diagnostic msg is not retransmitted".

$p \vee q = T$ — (1)

$\neg p = T$ — (2) X

$p \to q = T$ — (3)

$\neg q = T$. — (4) X.

from (2) $p = F$. — (5)

from (4) $q = F$ — (6)

put (5) & (6) in (1) $F \vee F = T$

$F = T$ which is not the case.

Hence Inconsistent.

Ex P20. 49-54. 7th Edition. HW.

Quiz # 1 :- 30-08-2023.

" Jawad is happy or he is hungry".

" Jawad is not happy".

Luminary

"If Jawad is happy then he is ~~angry~~".

"Jawad is hungry".

Determine Jawad status "happy" or "hungry"?