Discrete Math 1st Week's Friday

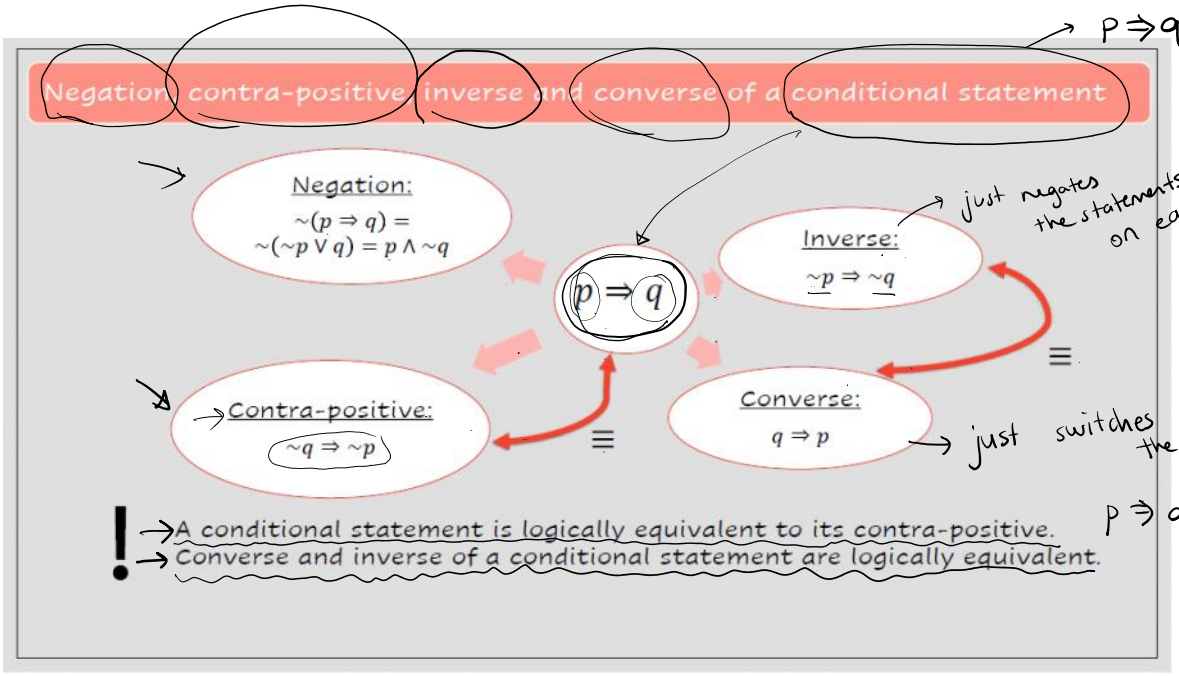
6 Ekim 2023 Cuma 09:34

$p \Rightarrow q$

p	q	p ⇒ q
T	T	T
T	F	F
F	T	T
F	F	T

$(p \vee \sim q) \Rightarrow \sim p$

p	q	~q	~p	p V ~q	(p V ~q) ⇒ ~p
T	T	F	F	T	F
T	F	T	F	T	F
F	T	F	T	F	T
F	F	T	T	T	T



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

$p \Rightarrow q \equiv \sim p \vee q$

p	q	p ⇒ q	~p	~p V q
T		T	F	T

we have proved that

p	q	$p \Rightarrow q$	$\sim p$	$\sim p \vee q$
T	T	T	F	T
T	F	F	F	F
F	T	T	T	T
F	F	T	T	T

$\equiv$

we have proved that

$p \Rightarrow q \equiv \sim p \vee q$

$\sim (p \Rightarrow q) = ?$ $\quad \sim (\sim p \vee q) \equiv (\sim(\sim p) \wedge \sim q$

$\equiv p \wedge \sim q$

$\sim (p \vee q) = \sim p \wedge \sim q$

$\sim [(p \wedge q) \Rightarrow (\sim p \vee \sim q)] \equiv (p \wedge q) \wedge \sim (\sim p \vee \sim q)$

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

$\equiv p \wedge q$

Contra-positive of $p \Rightarrow q$: $\sim q \Rightarrow \sim p$

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

p	q	$\sim q$	$\sim p$	$p \Rightarrow q$	$\sim q \Rightarrow \sim p$
T	T	F	F	T	T
T	F	T	F	F	F
F	T	F	T	T	T
F	F	T	T	T	T

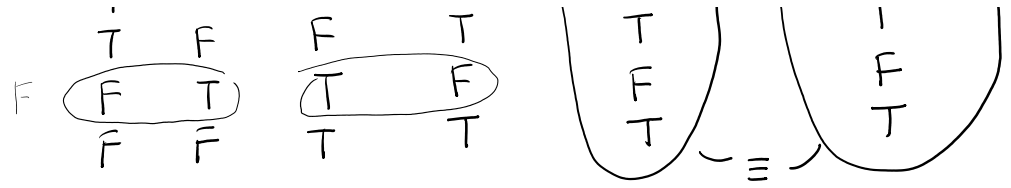
$\equiv$

Inverse of $p \Rightarrow q$: $\sim p \Rightarrow \sim q$

Converse of $p \Rightarrow q$: $q \Rightarrow p$

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

p	q	$\sim p$	$\sim q$	$q \Rightarrow p$	$\sim p \Rightarrow \sim q$
T	T	F	F	T	T
T	F	F	T	T	T
F	T	T	F	F	F
F	F	T	T	T	T



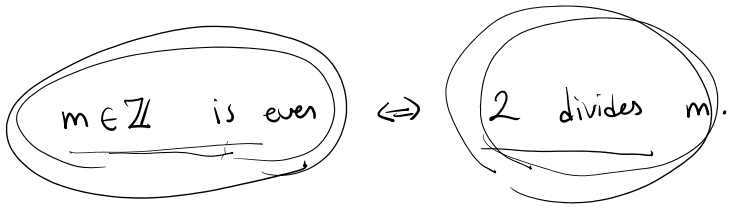
Bi-conditional

$$p \Leftrightarrow q \equiv (p \Rightarrow q) \wedge (q \Rightarrow p)$$

p	q	$p \Rightarrow q$	$q \Rightarrow p$	$(p \Rightarrow q) \wedge (q \Rightarrow p)$
T	T	T	T	T
T	F	F	T	F
F	T	T	F	F
F	F	T	T	T

$\rightarrow p \Leftrightarrow q$

Ex/ $p \Leftrightarrow q$



Ex

$$p \Rightarrow (\sim q \vee r) \quad \equiv \quad (p \Rightarrow \sim q) \vee r$$

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

→ If you heat the water it boils.

p ⇒ q

p q

¬q ⇒ ¬p

→ If the water does not boil than you're not heating it.

If x is a cat x is cute ✓ ≡

≡ if x is not cute than it is not cat. ✗