CORE111 Logical Problem Solving
Homework 1

Neha Faisal

February 19, 2017

1 Elections

(a) $p \vee q$:The election is decided or the votes have been counted

(b) $\neg p \wedge q$:The election is not decided and the votes have been counted

(c) $\neg q \vee (\neg p \wedge q)$: The votes have not been counted or the election is not decided and the votes have been counted

2 Think and Drive

(a) p $\rightarrow \neg q$

(b) q $\rightarrow p$

(c)$\neg p \rightarrow \neg q$

3 Arguments

(a) Converse: Whenever it is a sunny summer day I go to the beach.

Inverse: I do not go to the beach whenever it is not a sunny summer day.

Contra-positive: Whenever it is not a sunny summer day I do not go to the beach.

(b) Converse: It is necessary that I sleep until noon when I stay up late.

Inverse: When I don't stay up late, it is not necessary that I sleep until noon.

Contra-positive: It is not necessary that I sleep until noon when i do not stay up late.

4 Formulas

Here is the truth table for $p \to q$.

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

a) Neither

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

b) Neither

p	q	$\neg q$	p$\wedge\neg q$
F	F	T	F
F	T	F	F
T	F	T	F
T	T	F	T

c) Neither

(p$\to q) \to p$	((p$\to q) \to p) \to p$
T	F
T	F
F	T
T	T

d) Tautology

p	q	$\neg p$	$\neg q$	p$\to q$	$\neg q \to \neg p$	(p$\to q) \to (\neg q \to \neg p)$
F	F	T	T	T	T	T
F	T	T	F	T	T	T
T	F	F	T	F	F	T
T	T	F	F	T	T	T

e) Contradiction

p	q	$\neg p$	p$\to q$	p$\wedge(p \to q)$	(p$\wedge(p \to q)) \wedge \neg p$
F	F	T	T	F	F
F	T	T	T	F	F
T	F	F	F	F	F
T	T	F	T	T	F