Course Notes

CSCA67 - Discrete Mathematics

UNIVERSITY OF TORONTO SCARBOROUGH

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1 Propositions, Implications

Definitions:

A **proposition** is a statement that evaluates to True or False. In computer science, its often referred to as a **Boolean expression**.

A **compound roposition** is a proposition statementt that involves multiple propositions joined by connectives. It takes multiple truth values as input and returns a single truth value as output.

A **connective** corresponds to English conjunctions such as "and", "or", "not" etc.

Basic connectives and truth tables:

Symbol	Meaning
$\wedge$	"AND"
$\vee$	"OR"
$\rightarrow$	"IF...THEN"
$\leftrightarrow$	"IF AND ONLY IF"
$\neg$	"NOT"

P	Q	$P \wedge Q$	$P \vee Q$	$P \rightarrow Q$	$P \leftrightarrow Q$
T	T	T	T	T	T
T	F	F	T	F	F
F	T	F	T	T	F
F	F	F	F	T	T

Implication:

Different ways of writing $P \rightarrow Q$:

1. If P then Q
2. If P, Q
3. Q, if P
4. P only if Q
5. P is sufficient for Q
6. Q is neccesary for P
7. If not Q, then not P
8. Not P or Q