Artificial Intelligence Lecture Notes by Dr. Belal Al-Khateeb

Week No.: 7

Lecture Title: Propositional Logic and Resolution in Proposional Logic.

* **Propositional Logic**

"Water is liquid" true.
"Today is Monday" true.
"It is raining now" true.

* **Connectives**

AND	$\wedge$
OR	$\vee$
NOT	$\neg$
IMPLIES	$\Rightarrow$
EQUAL	=

P	Q	$P \wedge Q$	$P \vee Q$	$\neg P$	$P \Rightarrow Q$
T	T	T	T	F	T
T	F	F	T	F	F
F	T	F	T	T	T
F	F	F	F	T	T

- Sentences formed by these connectives are called well formed formulas (wff).
- Brackets of the form (,), [,], {, } can be used to group symbols into sub expressions and thus control the order of evaluation, for example $(P \vee Q)=R$ and $P \vee (Q=R)$.

* **<u>Common Identities in Propositional Logic</u>**

1- $\neg(\neg P) \equiv P$.
2- $(P \vee Q) \equiv (\neg P \Rightarrow Q)$.
3- $\neg(P \vee Q) \equiv (\neg P \wedge \neg Q)$.
4- $\neg(P \wedge Q) \equiv (\neg P \vee \neg Q)$.
5- $P \vee (Q \wedge R) \equiv (P \vee Q) \wedge (P \vee R)$.
6- $P \wedge (Q \vee R) \equiv (P \wedge Q) \vee (P \wedge R)$.
7- $P \wedge Q \equiv Q \wedge P$.
8- $P \vee Q \equiv Q \vee P$.
9- $(P \wedge Q) \wedge R \equiv P \wedge (Q \wedge R)$.
10- $(P \vee Q) \vee R \equiv P \vee (Q \vee R)$.
11- $P \Rightarrow Q \equiv \neg P \vee Q$. (Important).