

Al-Mustaqbal University
College of Science



KNOWLEDGE REPRESENTATION

1st CLASS / AI BRANCH

Assistant Lecturer: Hadi Salah

Lecture 2

Example: Use a truth table to list all possible truth value assignments to the propositions of the expression $(P \wedge Q) \vee (\neg Q \vee P)$.

- **Answer:**

P	Q	$P \wedge Q$	$\neg Q$	$\neg Q \vee P$	$(P \wedge Q) \vee (\neg Q \vee P)$
T	T	T	F	T	T
T	F	F	T	T	T
F	T	F	F	F	F
F	F	F	T	T	T

Example: Prove that $(P \wedge Q)$ is not equivalent to $(P \rightarrow Q)$; in other word prove $(P \wedge Q) \not\equiv (P \rightarrow Q)$

Answer:

P	Q	$(P \wedge Q)$	$(P \rightarrow Q)$	$(P \wedge Q) \not\equiv (P \rightarrow Q)$
T	T	T	T	T
T	F	F	F	T
F	T	F	T	F
F	F	F	T	F

Example: Suggest a propositional logic expression that is equivalent to **X** in the following truth table.

<i>P</i>	<i>Q</i>	<i>X</i>
T	T	T
T	F	T
F	T	T
F	F	T

Sol:

$$(P \wedge Q) \rightarrow Q$$

<i>P</i>	<i>Q</i>	$(P \wedge Q) \rightarrow Q$
T	T	T
T	F	T
F	T	T
F	F	T

Example: *Represent the following knowledge using the propositional logic method.*

- It is hot (fact)
P
- It is not hot (fact)
 $\neg P$
- If it is raining, then will not go to the mountain (rule)
P \rightarrow $\neg Q$
- The food is good and the service is good (fact)
X \wedge Y
- If the food is good and the service is good then the restaurant is good (rule)
X \wedge Y \rightarrow Z

Example: Represent the following knowledge using the propositional logic method.

“If it is sunny today, then the sun shines on the screen. If the sun shines on the screen, the blinds are brought down. The blinds are not down. Is it sunny today?”

Sol:

P= it is sunny today.

Q= the sun shines on the screen.

R= blinds are brought down.

$P \rightarrow Q.$

$Q \rightarrow R.$

$\neg R.$

P?

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- The propositional calculus has a **limitation** that it cannot deal properly with general statements because it represents each statement by using some symbols jointed with connectivity tools.