# Week1

## Proposition : T or F

Eg. p: Seattle is in CA

q: 2+2=4

## Truth Value

## Truth Table

|  |  |
| --- | --- |
| P | ┐P |
| T | F |
| F | T |

## Negation: NOT

## Conjunction: AND ^

|  |  |  |
| --- | --- | --- |
| P | q | P^q |
| T | T | T |
| T | F | F |
| F | T | F |
| F | F | F |

Eg. P^q

## Disjunction: OR ∨

Aka, Inclusive OR

OR truth table

## Exclusive OR: XOR ⊕

XOR truth table

## Conditional(Implication): →

False when p:t and q:f,

True otherwise

|  |  |  |
| --- | --- | --- |
| P  (hypothesis)  (premise) | Q  (conclusion) | P→q |
| T | T | T |
| T | F | F |
| F | T | T |
| F | F | T |

The hypothesis is true, then the conclusion has to be true.

The hypothesis is false, then the conclusion doesn’t matter, it’s always true.

## Biconditional: ←→

|  |  |  |
| --- | --- | --- |
| P | q | P←→q |
| T | T | T |
| T | F | F |
| F | T | F |
| F | F | T |

True when p:t and q:T,

True when p:f and q:f,

False otherwise.

Same as XOR

Logic orders: PEMDAS:

## IFF(if and only if): ←→

## Logical Equivalence

P ⊕q = ┐(p←→q)

┐(P ⊕q) = p←→q

Big Truth Table to prove it

## Predicate

P(x):x>3

Eg.p(x) : x lives in seattle

U: class → S(x)

## Universe of Discourse

U: integers greater than 1000

## Universal Quantifier:

## Existential Quantifier:

Eg.

P(x): x is a prof

Q(x): x is ignorant

R(x): x is vain

U: all people

1. No professor are ignorant

1. All ignorant people are vain

## Decimal, hexadecimal, octal, binary

## 2’s complement