# SNS COLLEGE OF ENGINEERING

**Kurumbapalayam(Po), Coimbatore – 641 107**
**Accredited by NAAC-UGC with 'A' Grade**
**Approved by AICTE, Recognized by UGC & Affiliated to Anna University, Chennai**

## Department of Information Technology

## Course Name – Software Engineering

## II Year / III Semester

## Unit-3 Reasoning Under Uncertainity

## Traditional Logic

Based on predicate logic

Three important assumptions:

- Predicate descriptions are sufficient w.r.t. to the domain
- Information is consistent
- Knowledge base grows monotonically

## Non-monotonic Logic

Addresses the three assumptions of traditional logic

- Knowledge is incomplete
  - No knowledge about p: true or false?
  - Prolog – closed world assumption
- Knowledge is inconsistent
  - Based on *how the world usually works*
  - Most birds fly, but Ostrich doesn't
- Knowledge base grows non-monotonically
  - New observation may contradict the existing knowledge, thus the existing knowledge may need removal.
  - Inference based on assumptions, how come if the assumptions are later shown to be incorrect

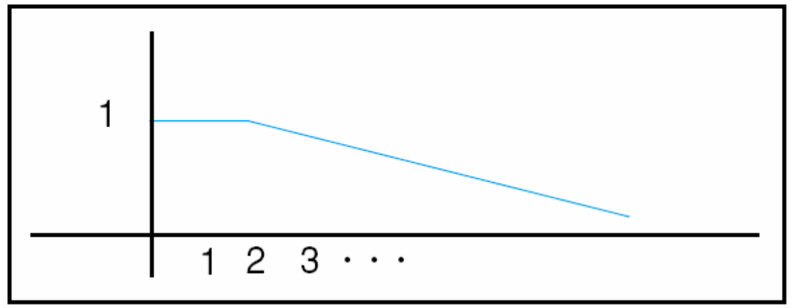
Three modal operators are introduced

# Fuzzy Sets

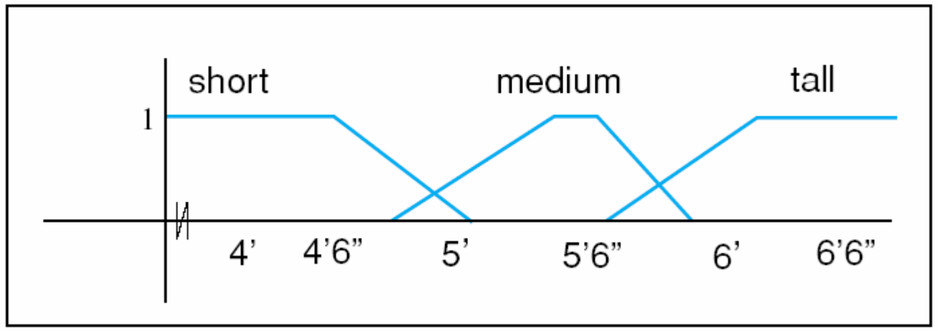
Classic sets
- Completeness: x in either A or ¬A
- Exclusive: can not be in both A and ¬A

Fuzzy sets
- Violate the two assumptions
- Possibility theory -- measure of confidence or believe
- Probability theory – randomness
- Process imprecision
- Introduce membership function
- Believe x∈A in some degree between 0 and 1, inclusive

The fuzzy set representation for “small integers.”



# A fuzzy set representation for the sets short, medium, and tall males.




## Fuzzy Set Operations

Fuzzy set operations are defined as the operations of membership functions

Complement: ¬A = C

mC = 1 – mA

Union: A ∪ B =C

mC = max(mA, mB)

Intersection: A ∩ B = C

mC = min(mA, mB)

Difference: A – B = C

mC = max(0, mA-mB)

# Fuzzy Inference Rules

Rule format and computation

If x is A and y is B then z is C

mC(z) = min(mA(x), mB(y))

If x is A or y is B then z is C

mC(z) = max(mA(x), mB(y))

If x is not A then z is C

mC(z) = 1 – mA(x)

The fuzzy regions for the input values θ (a) and dθ/dt (b).

N – Negative, Z – Zero, P – Positive