MTH645

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LRAIAB BIBI

**Question 1**

**Given:**

A universe of discourse X={S1,S2,S3,S4,S5,S6,S7}

Two fuzzy setsÃ&B~ on X:

A~={(S1​,0.3),(S2​,0.5),(S3​,0.8),(S4​,1.0),(S5​,0.2),(S6​,0.3),(S7​,0.7)}

B~={(S1​,0.2),(S2​,0.6),(S3​,0.4),(S4​,0.8),(S5​,0.9),(S6​,0.5),(S7​,0.3)}

To Evaluate:

1. (Ã∨B~)c=Ãc∧B~c
2. b) (Ã∧B~)c=Ãc∨B~c

#### Solution: Solution:

1. **Complement of** ÃÃC

{(S1​,0.7),(S2​,0.5),(S3​,0.2),(S4​,0.0),(S5​,0.8),(S6​,0.7),(S7​,0.3)}

**Complement of B~ I.e Bc**

*  B~c={(S1​,0.8),(S2​,0.4),(S3​,0.6),(S4​,0.2),(S5​,0.1),(S6​,0.5),(S7​,0.7)}

**Union (∨and Intersection (∧) Operations**:

For union Ã∨B~ take the maximum membership value for each element.

*  For intersection Ã∧B~, take the minimum membership value for each element.

**Complements of Union and Intersection**:

For (Ã∨B~)c, take the complement of the union (1 - maximum of each element's membership A~ and B~

For (Ã∧B~)c, take the complement of the intersection (1 - minimum of each element's membership is (Ã and ~B~).

### Question 2

#### Given:

Two triangular fuzzy numbers {A} = (1, 3, 7) B =(4,9,12).

#### To solve:

1. **Write their membership functions**:

#### The membership function for a triangular fuzzy number A~=(a,b,c) is defined as:

 For Ã=(1,3,7):

#### $$\left\{\begin{array}{c}0 X<1\\\frac{X-1}{3-1}-\left(X-1\right) 1<X<3\\\frac{7-X}{7-3}-\frac{7-X}{4} 3<X<7\\0 X>7\\\end{array}\right.$$

####

#### For B=(4,9,12):

#### $$\left\{\begin{array}{c}0 X<4\\\frac{X-4}{9-4}-\frac{\left(X-4\right)}{5} 4<X<9\\\frac{12-X}{12-9}-\frac{12-X}{3} 9<X<12\\0 X>12\end{array}\right.$$

b) **Calculate their intersection**:

* The intersection Ã∧ B~is found by taking the minimum membership values between µAX  for µBB each x.