Tutorial 2

Exercise 1

Let $X = [0,1]$ with $\alpha, \beta \in R$ and let $a, b \in R$. Define the fuzzy set A on X as follows:

$$\mu A(x) = \begin{cases} 0, \text{ if } x < a - \alpha \text{ or } b + \beta < x \\ 1, \text{ if } a < x < b \\ 1 + x - \alpha a, \text{ if } a - \alpha < x < a \\ 1 - b - \beta x, \text{ if } b < x < b + \beta \end{cases}$$

Determine $\text{Ker}(A), \text{Supp}(A)$ and $H(A)$.

Exercise 2

Let $X = \{1, 2, 3, \ldots, 10\}$ and A a fuzzy subset of X given by:

$$A = \{< 1, 0.2 >, < 2, 0.5 >, < 3, 0.8 >, < 4, 1.0 >, < 5, 0.7 >, < 6, 0.3 >, < 7, 0.0 >, < 8, 0.0 >, < 9, 0.0 >, < 10, 0.0 >\}$$

Determine all α-cuts of A.

Exercise 3

Let A, B are two a fuzzy subset on a universe X and $\alpha, \beta \in [0,1]$

(1) if $\alpha \leq \beta$, then $A_\beta \subseteq A_\alpha$

(2) $(A \cap B)_\alpha = A_\alpha \cap B_\alpha$

(3) $(A \cup B)_\alpha = A_\alpha \cup B_\alpha$

Exercise 4

1. $T_0(x,y) = \begin{cases} 0, (x,y) \in [0,1[^2 \\ \min(x,y) \text{ otherwise.} \end{cases}$

2. $T_1(x,y) = \max(x + y - 1, 0)$.

3. $T_{1.5}(x,y) = 2 - x - xyy + xy$.

4. $T_2(x,y) = xy$.

5. $T_{2.5}(x,y) = x + xyy - xy$.

6. $T_3(x,y) = \min(x,y)$.

Show that we have: $T_0 \leq T_1 \leq T_{1.5} \leq T_2 \leq T_{2.5} \leq T_3$.