

Exercises from fuzzy propositional and set operations.

Exercise 4.1

1. Verify that operation $\dot{\vee}$ defined by

$$\alpha \dot{\vee} \beta = \sqrt{\alpha^2 + \beta^2 - \alpha^2 \beta^2}$$

is a fuzzy disjunction.

2. Find the fuzzy conjunction dual to $\dot{\vee}$ with respect to the fuzzy negation

$$\dot{\neg} \alpha = \sqrt{1 - \alpha^2}. \quad (1)$$

Exercise 4.2 Fuzzy subsets A, B of $\mathbb{R}$ have membership functions

$$\mu_A(x) = \begin{cases} x - 1, & 1 < x < 2, \\ 1, & 2 \leq x \leq 3, \\ \frac{5-x}{2}, & 3 < x < 5, \\ 0, & \text{otherwise.} \end{cases}$$

$$\mu_B(x) = \begin{cases} \frac{x}{3}, & 0 < x < 3, \\ 1, & 3 \leq x \leq 4, \\ \frac{6-x}{2}, & 4 < x < 6, \\ 0, & \text{otherwise.} \end{cases}$$

Find

1. $A \sqcap B$,
2. $A \overset{L}{\cup} B$.

Describe the results by formulas and draw their graphs.