Assignment #2

No late assignments accepted!

ECE449, Intelligent Systems Engineering — Fall 2019

Department of Electrical and Computer Engineering, University of Alberta — Dr. Petr Musilek

Points: 10

Due: Thursday, September 26, 2019, 3:30 PM, in the assignment box in the ETLC atrium

Note: Show your work! Marks are allocated for technique and not just the answer.

Student Name:

ID Number:

1. [6 marks] Show that drastic product and drastic sum (defined below) satisfy the law of contradiction ($A \cap \bar{A} = \emptyset$) and the law of excluded middle ($A \cup \bar{A} = X$). [Hint: substitute the **t**-norm and **s**-norm operation for intersection and union in the two laws, respectively]

Drastic product

$$x \,\mathbf{t}\, y = \begin{cases} x & \text{if } y = 1 \\ y & \text{if } x = 1 \\ 0 & \text{otherwise} \end{cases}$$

Drastic sum

$$x \,\mathbf{s}\, y = \begin{cases} y & \text{if } x = 0 \\ x & \text{if } y = 0 \\ 1 & \text{otherwise} \end{cases}$$

2. [4 marks] Assume a fuzzy set $A = [1.0, 0.8, 0.5, 0.1, 0]$ defined on universe $X = \{1,2,3,4,5\}$. Find all of it's unique α-cuts. Show how A can be expressed in terms of the family of all of its α-cuts.