Minoufia University
Faculty of Electronic Eng.
Dep. Of Ind. Electronics and Control Eng.

جامعة المنوفية

Mid-Term Exam – 4th year
Intelligent Control Systems – ACE423
Time Allowed: 1 hour
30-3-2019

الإسم :---------- الفصل :---------- الدرجة :----------

Answer the following questions:

1) What is the classifications of fuzzy sets?

2) Consider the two fuzzy sets $\mathbf{A_1}$ and $\mathbf{A_2}$ defined on the following $X = \{0.6, 1.5, 2.5, 3.5, 4.5\}$ and a fuzzy set **B** defined on the following $Y = \{-0.6, 1, 1.5\}$. The three fuzzy sets are represented by the following:

$$\mu_{A_1}(x) = trapezoid(x; 0, 1, 3, 4),\ \mu_{A_2}(x) = triangle(x; 2, 4, 5) \text{ and}$$

$$\mu_B(y) = triangle(y; -1, 0, 2)$$

A) Find the following:-

a) Bounded difference between A_1 and A_2. b) $B_{0.3}$ c) CON (A_1) d) DIL (B)

B) Determine a fuzzy relation **R** representing the following fuzzy rules:

$$Rule\ 1: IF\ x\ is\ A_1\ THEN\ y\ is\ B$$
$$Rule\ 2: IF\ x\ is\ A_2\ THEN\ y\ is\ B$$

using the **Mamdani** implication method.

C) Find the fuzzy output if the input $x_o = 1.5$ using the **Max-Product composition**.

What are the types of activation functions? What are the difference between them?

With our best wishes…….Prof. Nabila El-Rabaie and Dr. Ahmad M. El-Nagar