Unit 4 - Week 2

Week 2 Assignment 2

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2020-02-12, 23:59 IST.

1) If $x \text{ is } A \text{ then } y \text{ is } B \text{ else } y \text{ is } C$. The output of the given fuzzy rule is *1 point*

a. a fuzzy set
b. a crisp set
c. a fuzzy relation
d. a membership function

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
c.

2) The truth value of *1 point*
R: "If mango is sweet then cost is high" given P: mango is sweet with $\mu(P)$ = 0.3 and Q: cost is high with $\mu(Q)$ = 0.7 then

a. $\mu(R)$ = 0.3
b. $\mu(R)$ = 0.5
c. $\mu(R)$ = 0.7
d. $\mu(R)$ = 0.0

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
c.

3) The cardinality of the fuzzy set on any universe is *1 point*

a. infinity
b. 0
c. 1
d. -1

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
a.

4) Given a crisp set $A = \{1,2,3,4\}$. Find the relation matrix for the relation $R: \{(a,b) \mid b = a + 1, \; a,b \in A\}$ *1 point*

a. $\begin{array}{c|cccc} & 1 & 2 & 3 & 4 \\ \hline 1 & 0 & 0 & 0 & 1 \\ 2 & 0 & 0 & 1 & 0 \\ 3 & 0 & 1 & 0 & 0 \\ 4 & 0 & 0 & 1 & 0 \end{array}$

b. $\begin{array}{c|cccc} & 1 & 2 & 3 & 4 \\ \hline 1 & 0 & 1 & 0 & 0 \\ 2 & 0 & 0 & 1 & 0 \\ 3 & 0 & 0 & 0 & 1 \\ 4 & 0 & 0 & 0 & 0 \end{array}$

c. $\begin{array}{c|cccc} & 1 & 2 & 3 & 4 \\ \hline 1 & 0 & 1 & 0 & 0 \\ 2 & 0 & 0 & 1 & 0 \\ 3 & 0 & 1 & 0 & 0 \\ 4 & 0 & 0 & 1 & 0 \end{array}$

d. $\begin{array}{c|cccc} & 1 & 2 & 3 & 4 \\ \hline 1 & 1 & 0 & 0 & 0 \\ 2 & 0 & 1 & 0 & 0 \\ 3 & 0 & 0 & 1 & 0 \\ 4 & 0 & 0 & 0 & 1 \end{array}$

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
b.

5) Let $X= \{a, b, c, d\}$ $Y= \{1, 2, 3, 4\}$ *0 points*
and $A= \{(a,0.0), (b,0.8), (c,0.6), (d,1.0)\}$
$B= \{(1,0.2), (2,1.0), (3,0.8), (4,0.0)\}$

Determine the implication relation: $\textit{If } x \textit{ is } A \textit{ then } y \textit{ is } B$

a. $\begin{array}{c|cccc} & 1 & 2 & 3 & 4 \\ \hline a & 0 & 0 & 0 & 0 \\ b & 0.2 & 0.8 & 0.8 & 0 \\ c & 0.2 & 0.6 & 0.6 & 0 \\ d & 0.2 & 1 & 0.8 & 0 \end{array}$

b. $\begin{array}{c|cccc} & 1 & 2 & 3 & 4 \\ \hline a & 1 & 1 & 1 & 1 \\ b & 0.2 & 0.8 & 0.8 & 0.2 \\ c & 0.4 & 0.6 & 0.6 & 0.4 \\ d & 0.2 & 1 & 0.8 & 0 \end{array}$

c. $\begin{array}{c|cccc} & 1 & 2 & 3 & 4 \\ \hline a & 0 & 0.4 & 1 & 0.8 \\ b & 0.2 & 0.8 & 0.8 & 0.2 \\ c & 0.2 & 0.6 & 0.6 & 0.4 \\ d & 0.2 & 1 & 0.8 & 0 \end{array}$

d. $\begin{array}{c|cccc} & 1 & 2 & 3 & 4 \\ \hline a & 0 & 0.4 & 1 & 0.8 \\ b & 0 & 0.2 & 0.2 & 0.2 \\ c & 0 & 0.4 & 0.4 & 0.4 \\ d & 0 & 0 & 0 & 0 \end{array}$

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
b.

6) Let $P = \begin{bmatrix} 0.3 & 0.5 & 0.8 \\ 0 & 0.7 & 1 \\ 0.4 & 0.6 & 0.5 \end{bmatrix}$ and $Q = \begin{bmatrix} 0.9 & 0.5 & 0.7 & 0.7 \\ 0.3 & 0.2 & 0 & 0.9 \\ 1 & 0 & 0.5 & 0.5 \end{bmatrix}$ Find R where $R = P \circ Q$ using max-min composition *1 point*

a. $R = \begin{bmatrix} 0.8 & 0.3 & 0.5 & 0.5 \\ 1 & 0.2 & 0.5 & 0.7 \\ 0.5 & 0.4 & 0.5 & 0.6 \end{bmatrix}$

b. $R = \begin{bmatrix} 0.8 & 0.3 & 0.5 & 0.5 \\ 0.5 & 0.2 & 0.8 & 0.7 \\ 0.5 & 0.5 & 0.5 & 0.5 \end{bmatrix}$

c. $R = \begin{bmatrix} 1 & 1 & 0.5 & 0.5 \\ 0.5 & 0.5 & 0.5 & 1 \\ 0.5 & 0.5 & 0.5 & 0.5 \end{bmatrix}$

d. $R = \begin{bmatrix} 1 & 1 & 1 & 1 \\ 0 & 0 & 0.8 & 0.7 \\ 0.5 & 0.5 & 0 & 0.5 \end{bmatrix}$

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
a.

7) $(\sim(P \wedge Q) \Rightarrow R) \wedge P \wedge Q$ is equivalent to *1 point*

a. $(P \wedge Q)$
b. $(P \wedge Q) \vee R$
c. P
d. $(\sim P \vee Q)$

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
a.

8) If $x \textit{ is } A \textit{ then } y \textit{ is } B \textit{ else } y \textit{ is } C$, then the relation R is equivalent to *1 point*

a. $(A \times B) + (B \times C)$
b. $(A \times B) \cup (\bar{A} \times C)$
c. $(A \times B) \rightarrow (B \times C)$
d. $(A \times C) \cup (B \times C)$

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
b.

9) What are the applications of Fuzzy Inference Systems? *1 point*

a. Wireless services, heat control and printers
b. Restrict power usage, telephone lines and sort data
c. Simulink, boiler and CD recording
d. Automatic control, decision analysis and data classification

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
d.

10) "Generalized Modus Tollen (GMT)" rule which is as follows: *1 point*

If x is A Then y is B
y is B'
____
x is A'

A' can be calculated as

a. $A' = B' \circ R\,(x,y)$
b. $A' = (A \times B) \cup (\bar{A} \times Y)$
c. $A' = A \circ R\,(x,y)$
d. $A' = (A \times B) \cup (\bar{A} \times X)$

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
a.

11) Zadeh's max-min rule is defined as: *1 point*

a. $R = \int_{X \times Y} \mu_A(x) * \mu_B(y) \,|(x,y)$
b. $R = \bar{A} \cup B = \int_{X \times Y} (1 - \mu_A(x)) \vee \mu_B(x) \,|(x,y)$
c. $R = \bar{A} \cup B = \int_{X \times Y} 1 \wedge (1 - \mu_A(x) + \mu_B(y)) \,|(x,y)$
d. $R = \bar{A} \cup (A \cap B) = \int_{X \times Y} (1 - \mu_A(x)) \vee (\mu_A(x) \wedge \mu_B(y)) \,|(x,y)$

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
d.

12) Larsen rule is defined as: *1 point*

a. $R = A \times B = \int_{X \times Y} \mu_A(x) \wedge \mu_B(y) \,|(x,y)$
b. $R = A \times B = \int_{X \times Y} \mu_A(x) . \mu_B(y) \,|(x,y)$
c. $R = A \times B = \int_{X \times Y} \mu_A(x) \odot \mu_B(y) \,|(x,y)$
d. $R = A \times B = \int_{X \times Y} \mu_A(x) \hat{\bullet} \mu_B(y) \,|(x,y)$

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
b.

13) Find the results of the fuzzy operations as instructed in the following: *1 point*

$R = A \times B$ where

$A = \left\{\frac{0.1}{x_1}, \frac{0.2}{x_3}, \frac{0.5}{x_5}\right\}$

$B = \left\{\frac{0.6}{x_2}, \frac{0.8}{x_3}, \frac{1.0}{x_6}\right\}$

Using Mamdani rule.

a.

X	x_1	x_2	x_3	x_5	x_6
x_1	0.0	0.1	0.1	0.0	0.1
x_2	0.0	0.0	0.0	0.0	0.0
x_3	0.0	0.2	0.2	0.0	0.2
x_5	0.0	0.5	0.5	0.0	0.5
x_6	0.0	0.0	0.0	0.0	0.0

b.

X	x_1	x_2	x_3	x_5	x_6
x_1	0.0	0.1	0.1	0.0	0.1
x_2	0.0	0.0	0.0	0.0	0.0
x_3	0.0	0.1	0.1	0.0	0.1
x_5	0.0	0.5	0.5	0.0	0.5
x_6	0.0	0.0	0.0	0.0	0.0

c.

X	x_1	x_2	x_3	x_5	x_6
x_1	0.0	0.1	0.1	0.0	0.1
x_2	0.0	0.2	0.2	0.0	0.2
x_3	0.0	0.2	0.2	0.0	0.2
x_5	0.0	0.5	0.5	0.0	0.5
x_6	0.0	0.0	0.0	0.0	0.0

d.

X	x_1	x_2	x_3	x_5	x_6
x_1	0.0	0.1	0.1	0.0	0.1
x_2	0.0	0.0	0.0	0.0	0.0
x_3	0.0	0.2	0.2	0.0	0.2
x_5	0.0	0.5	0.5	0.0	0.5
x_6	0.0	0.2	0.2	0.0	0.2

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
a.

14) Given that "$x \textit{ is Sweet}$" with $T(x) = 0.8$ and "$y \textit{ is Sweet}$" with $T(y) = 0.6$. The Fuzzy truth value of "$\textit{If } x \textit{ is Sweet then } y \textit{ is Sweet}$" is *1 point*

a. 0.4
b. 0.2
c. 0.8
d. 0.6

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
d.

15) The cardinality of the given set $A = \{1,2,3,4,5\}$ *1 point*

a. 2
b. 5
c. 4
d. 1

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
b.