

Qn2.a Fuzzy Logic

Given the following fuzzy sets for a variable.



Find DOM in normalized form (0~1) for the sets when a car speed equals 70. Round off the answer to 2 decimal places if necessary (Ex: 0.226->0.23, 0.1->0.1).

Answers:

DOM for OSpeedLow	<u>0.25</u>	Solution: $1-(70-40)/(80-40) = 1-30/40$
DOM for OSpeedMedium	<u>0.75</u>	Solution: $(70-40)/(80-40) = 30/40$
DOM for OSpeedHigh	<u>0</u>	

Qn2.b Fuzzy Logic**Given:**

- DOMs for sets A,B, and C:
 - $\text{DOM}(A) = 0.1$
 - $\text{DOM}(B) = 0.5$
 - $\text{DOM}(C) = 0.4$
- Rules:
 - **IF (A AND B) OR C THEN D**
 - **IF A OR B OR NOT C THEN E**
 - **IF D AND E THEN F**

Find: Evaluate the rules to find DOM for set F.

0.4

Answer: DOM for F _____

Solution:

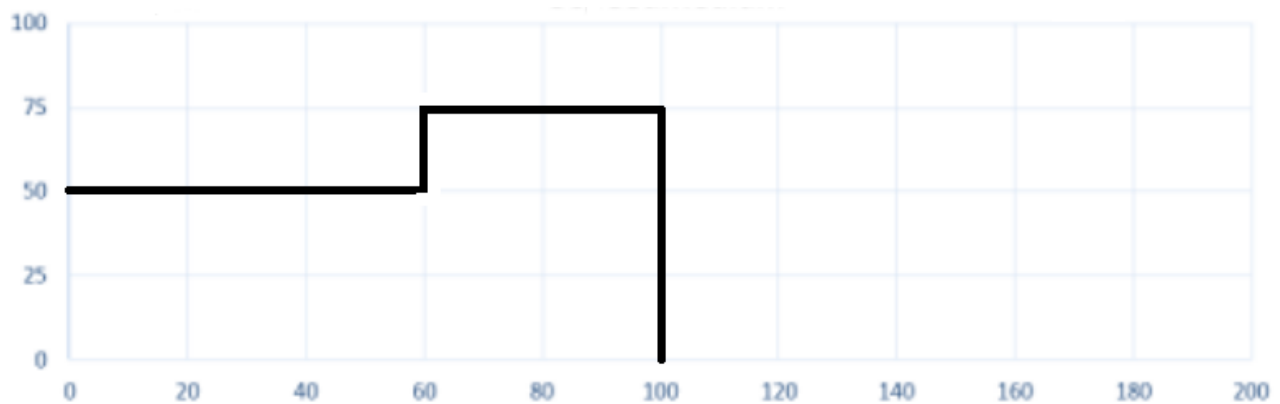
$$\text{DOM}(D) = \max(\min(0.1, 0.5), 0.4) = 0.4$$

$$\text{DOM}(E) = \max(0.1, 0.5, 1-0.4) = 0.6$$

$$\text{DOM}(F) = \min(0.4, 0.6) = 0.4$$

Qn2.c Fuzzy Logic

Given: Sets of a variable after aggregation.



Find: Crisp rounded value after defuzzification by using centroid method. Round off the answer to 2 decimal places if necessary (Ex: 0.226->0.23, 0.1->0.1).

Answer: **55**

Solution:

Set sampling step 20. Centroid is calculated by geometric decomposition

Answer is $A / T = 330\,000 / 6000 = 55$

where $A = 10 \cdot 1000 + 30 \cdot 1000 + 50 \cdot 1000 + 70 \cdot 1500 + 90 \cdot 1500 = 90\,000 + 240\,000 = 330\,000$

$T = 1000 + 1000 + 1000 + 1500 + 1500 = 6000$