④ Fuzzy variables are

Income : { Low, medium, High}
Speed { L M H }
TV show { Boring ok Fasinating}
Meal { So so, Good Delicious}
Traffic Light { Red Yellow, Green}

⑤ a) When the pressure is 1020 mb the arrow is up with M = 0.5, down with M = 0 and middle with M = 0.25

b) $M_{\text{moving down}} = 0.75$ $M_{\text{moving up}} = 0$

c) M (arrow is down) = 0
M (arrow is in middle AND moving down) = min [0.25, 0.75] = 025
M (arrow is in middle AND moving up) = min [0.25, 0] = 0
M (arrow is up) = 0.5

M_1 (cloud) = 0
M_2 (Cloud) = 0.25 × 0.6 = 0.15
M_1 (sunny) = 0 × 0.6 = 0
M_2 (sunny) = 0.5 × 0.8 → 0.4

$$M(x) = M_1(x) + M_2(x) - M_1(x) * M_2(x)$$

M (Cloud) = 0 + 0.15 − 0 × 0.15 = 0.15
M (sunny) = 0 + 0.4 − 0 × 0.4 = 0.4

⑦ $A = \{(1, 0.1)\ (2\ 0.5)\ (3, 0.8)\ (4, 1)\ (5\ 0.7)\ (6\ 0.2)\}$

$B = \{(1, 1)\ (2, 0.8)\ (3, 0.4)\ (4, 0.1)\}$

The comfortable house for a 4 person family or small

$A \cup B = \{(1, 1)\ (2, 0.8)\ (3\ 0.4)\ (4, 0.1)\}$

The comfortable house for a 4 person family and small

$A \cap B = \{(1, 0.1)\ (2, 0.5)\ (3, 0.4)\ (4, 0.1)\}$

10 $U = \{1\ 2\ 3\ 4\ 5\ 6\ 7\ 8\ 9\ 10\}$

$C = \{0.2/1, 0.5/2\ 0.8/3\ 1/4\ .7/5\ .3/6\ 0/7\ 0/8\ 0/9\ 0/10\}$

$L = \{0/1\ 0/2\ 0.2/3\ 0.4/4\ 0.6/5\ 0.8/6\ 1/7\ 1/8\ 1/9\ 1/10\}$

$C \cap L = \{0/1\ 0/2\ .2/3\ .4/4\ .6/5\ .3/6\ 0/7\ .0/8\ 0/9\ 0/10\}$

Here 5 bedroom is optimal with $\mu_{satisfactory} = 0.6$

$C \cup L = \{0.2/1\ 0.5/2\ 0.8/3\ 1/4\ 0.7/5\ 0.8/6\ 1/7\ 1/8\ 1/9\ 1/10\}$

Here 4 bedroom is fully satisfactory $\mu_{satisfactory} = 1.0$

$L^c = \{1/1\ 1/2\ 0.8/3\ 0.6/4\ 0.4/5\ 0.2/6\ 0/7\ 0/8\ 0/9\ 0/10\}$

8 Excellent {(8,0.2) (9,0.6) (10,1)}

Good {(6,0.1) (7,0.5) (8,0.9) (9,1) (10,1)}

Fair = {(2,0.2) (3,0.5) (4,0.8) (5,1) (6,0.8) (7,0.5) (8,0.2)}

Bad = {(1,1) (2,0.7) (3,0.4) (4,1)}

9 If moderately approved is linear

~~$\mu_{0.75}$ = { 0%~~ S = { 0/0%, 0.25/10%, 0.5/20%, 0.75/30%, 1/40%}

$\alpha_{0.75}$ =

$\alpha_{0.5}$

Job	μ salary	μ interest	μ prior	S*I*D Fuzzy score	
1	0.875	.4	1	0.035	
2	.7	.6	.9	0.378	Most suitable
3	.5	.8	.7	0.28	
4	.5	.6	1	0.3	

For each element R(x,y) in the matrix determine whether it is greater than or equal to α value if R(x,y) is $\geq \alpha$ set corresponding entry in the alpha cut relation matrix to 1

For $\alpha = 0.2$

$$\begin{pmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{pmatrix}$$

$\alpha = 0.4$

$$\begin{pmatrix} 1 & 0 & 0 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{pmatrix}$$