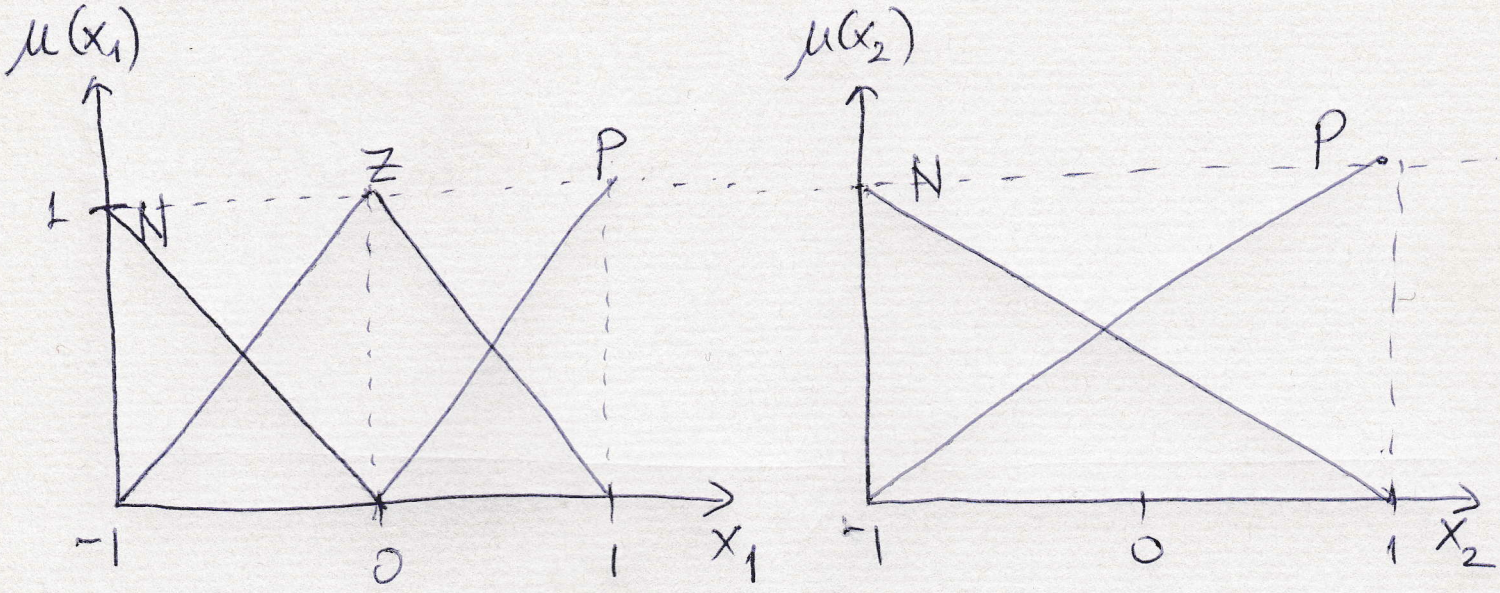
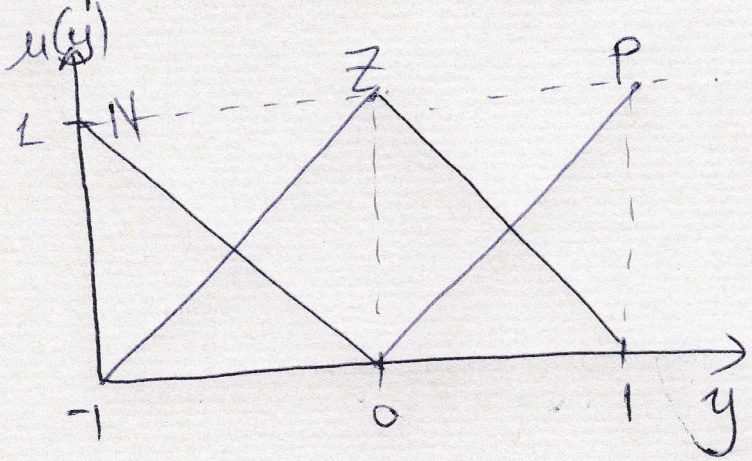
Example 1



Inputs: x_1, x_2



Output: y

Rule Table

x_1 \ x_2	N	P
N	P	Z
Z	Z	N
P	P	N

R1: IF X_1 is N AND X_2 is N, THEN y is P

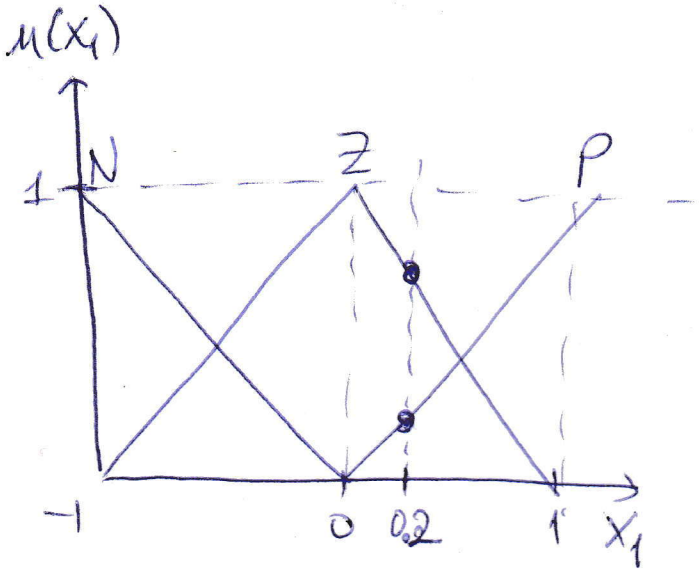
Use:

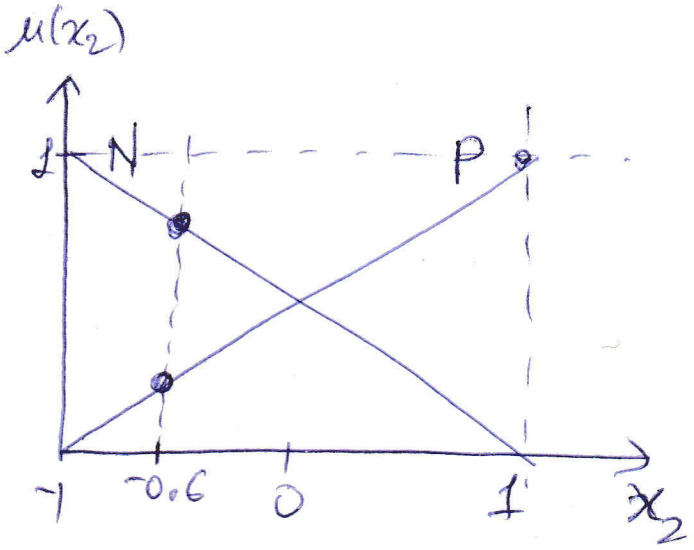
- Max-min method as the inference mechanism
- "Min" as the "AND" operator
- "Largest of max" as the defuzzification method.

$x_1 = 0.2$

$x_2 = -0.6$

Find y?





$\mu_N(x_1) = 0$

$\mu_Z(x_1) = 0.8$

$\mu_P(x_1) = 0.2$

$\mu_N(x_2) = 0.8$

$\mu_P(x_2) = 0.2$

R1: $\min(\mu_N(x_1), \mu_N(x_2)) = \min(0, 0.8) = 0$ (P)

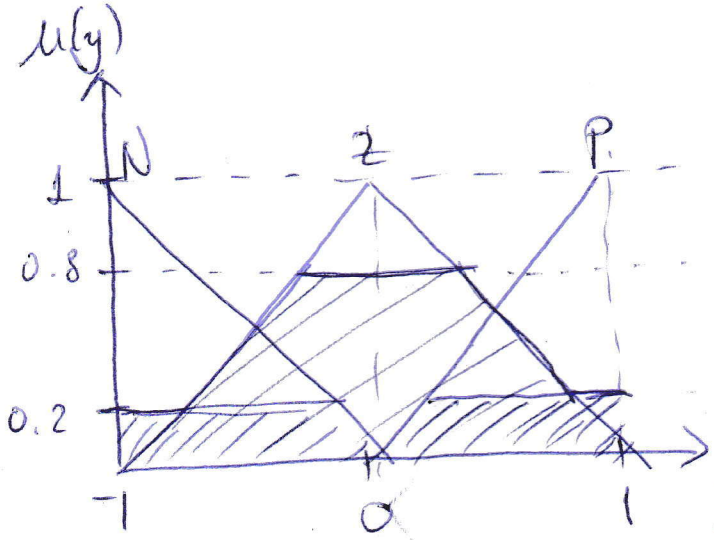
R2: $\min(\mu_N(x_1), \mu_P(x_2)) = \min(0, 0.2) = 0$ (Z)

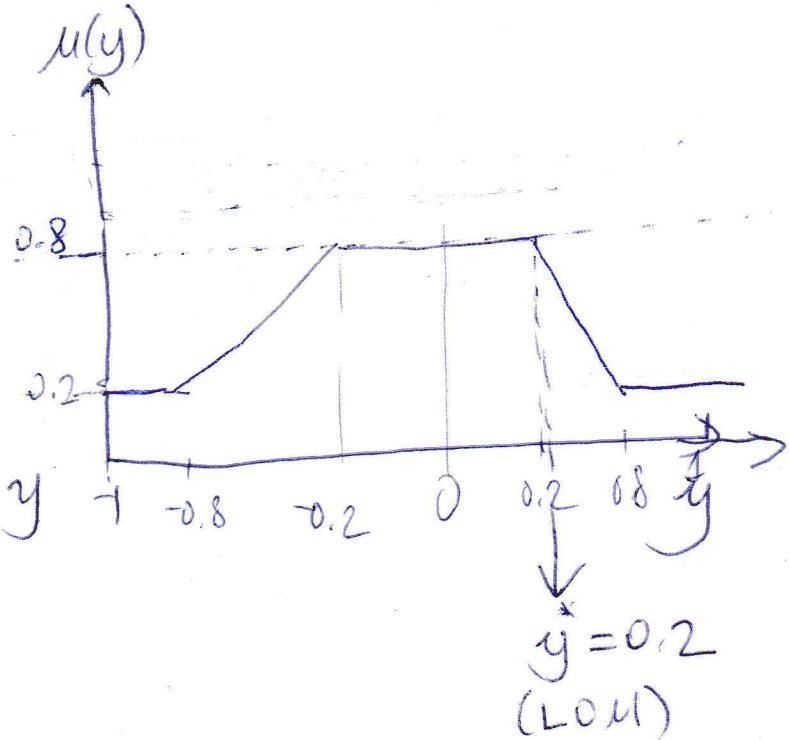
R3: $\min(\mu_Z(x_1), \mu_N(x_2)) = \min(0.8, 0.8) = 0.8$ (Z)

R4: $\min(\mu_Z(x_1), \mu_P(x_2)) = \min(0.8, 0.2) = 0.2$ (N)

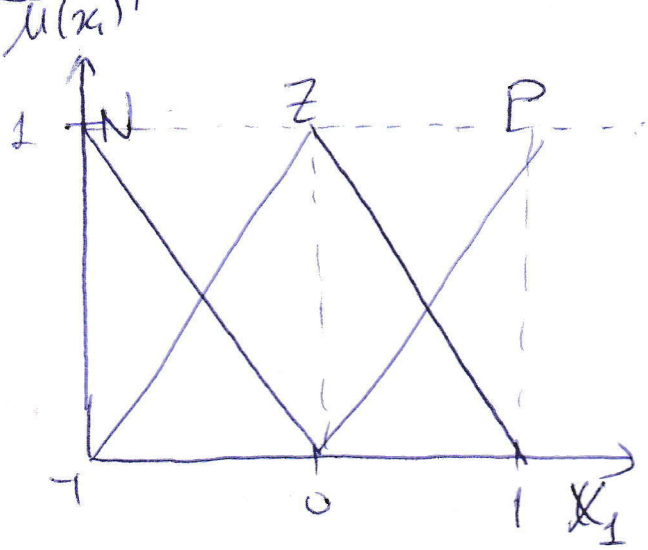
R5: $\min(\mu_P(x_1), \mu_N(x_2)) = \min(0.2, 0.8) = 0.2$ (P)

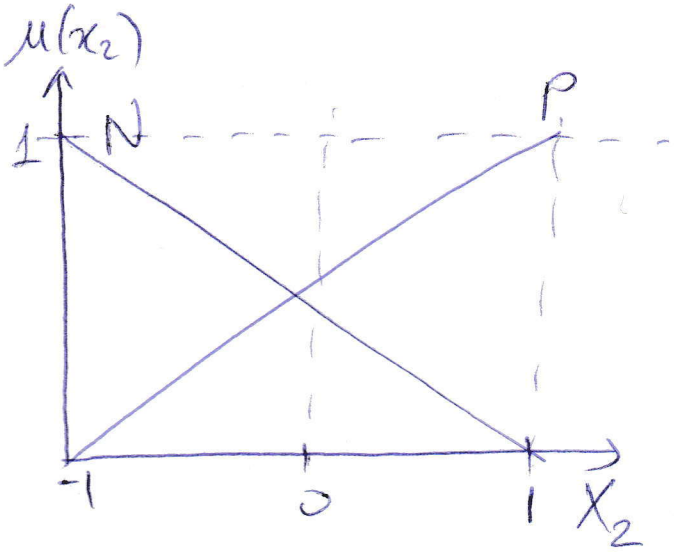
R6: $\min(\mu_P(x_1), \mu_P(x_2)) = \min(0.2, 0.2) = 0.2$ (N)



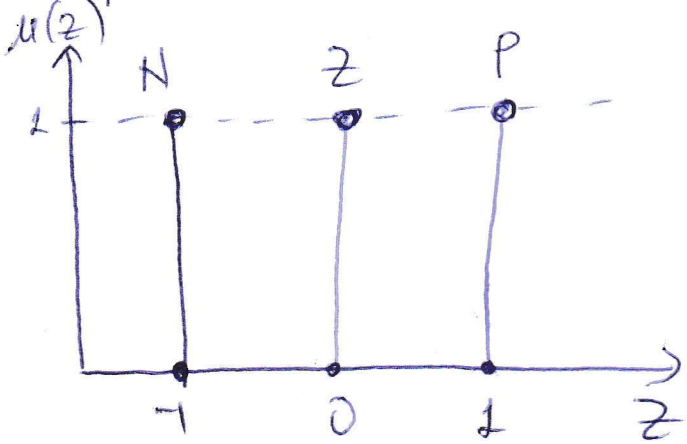


Example 2





Inputs: x_1, x_2



Output: z

Rule Table

x_1 \ x_2	N	P
N	P	Z
Z	Z	N
P	P	N

- Use "Product" for "AND"
- "Weighted Average" for defuzzification method.

$x_1 = 0.2$
$x_2 = -0.6$
} z = ?

$\mu_N(x_1) = 0$
$\mu_Z(x_1) = 0.8$
$\mu_P(x_1) = 0.2$
$\mu_N(x_2) = 0.8$
$\mu_P(x_2) = 0.2$

R1: $\mu_N(x_1)\,\mu_N(x_2) = 0$ (P)
R2: $\mu_N(x_1)\,\mu_P(x_2) = 0$ (Z)
R3: $\mu_Z(x_1)\,\mu_N(x_2) = 0.8 \times 0.8 = 0.64$ (Z)
R4: $\mu_Z(x_1)\,\mu_P(x_2) = 0.8 \times 0.2 = 0.16$ (N)
R5: $\mu_P(x_1)\,\mu_N(x_2) = 0.2 \times 0.8 = 0.16$ (P)
R6: $\mu_P(x_1)\,\mu_P(x_2) = 0.2 \times 0.2 = 0.04$ (N)

$$z^* = \frac{0.64 \times \overset{Z}{0} + 0.16 \times (-1) + 0.16 \times (+1) + 0.04 \times (-1)}{0.64 + 0.16 + 0.16 + 0.04}$$

(N P N)

$$z^* = -0.04$$