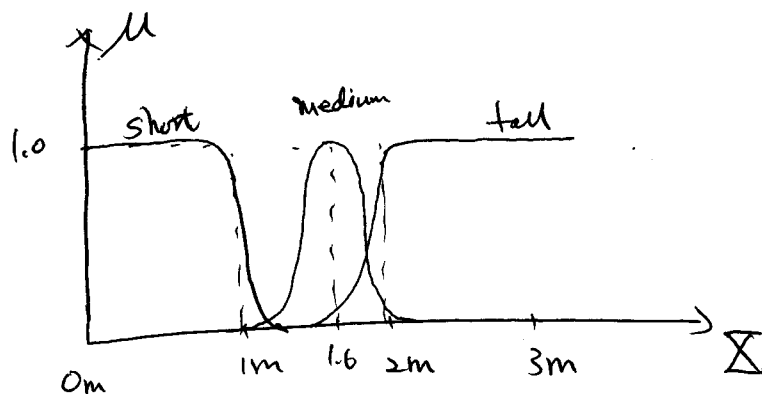


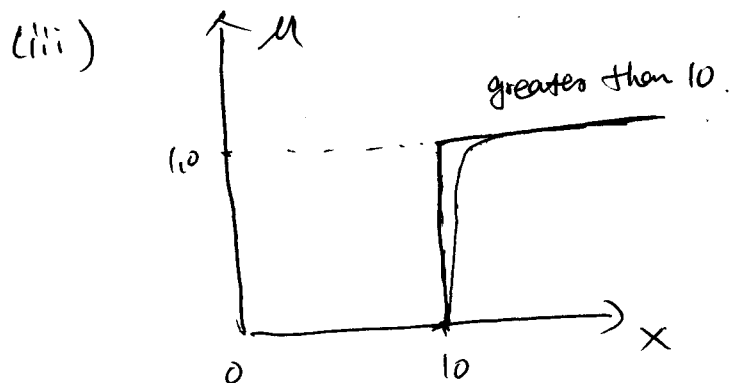
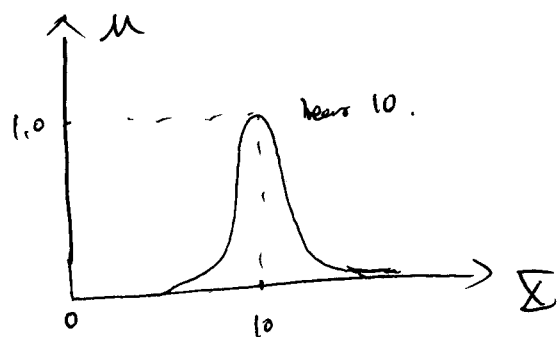
Tut 1:

Q1:

(i)  $\Sigma = \{ \text{people of height } x \in (0, +\infty) \}$



(ii)  $\Sigma = \text{"all numbers"}$



Q2:

$$(a) \quad A \cup B = 1.0/f_{16} + 0.5/f_4 + 0.9/f_{14} + 0.8/f_{15} + 0.8/f_{11} \\ + 1.0/b_{117} + 1.0/b_{52} + 0.5/a_{10}$$

$$(b) \quad A \cap B = 0.2/f_{16} + 0.4/f_4 + 0/a_{10} + 0.5/f_{14} + 0.6/f_{15} + 0.3/f_{11} \\ + 0.1/b_{117} + 0/b_{52}.$$

$$(c) \quad \bar{A} = 0.5/a_{10} + 0/b_{52} + 0/b_{117} + 1.0/c_5 + 1.0/c_{130} + 0.6/f_4 \\ + 0.5/f_{14} + 0.4/f_{15} + 0.8/f_{16} + 0.2/f_{11} + 1.0/kc_{130}$$

$$(d) \quad \bar{B} = 1.0/a_{10} + 0.9/b_{117} + 1.0/b_{52} ~~0.9/b_{52}~~ + 1.0/c_5 + 1.0/c_{130} \\ + 0.5/f_4 + 0.1/f_{14} + 0.2/f_{15} + 0/f_{16} + 0.7/f_{11} + 1.0/kc_{130}$$

Q3:  $X = \{-2, -1, 0, 1, 2\}$

$$A = 0/2 + 0/1 + 1/0 + 1/1 + 0/2$$

$$Y = f(X) = \{10, 6, 2\}$$

$$B = 0/10 + 1/6 + 1/2$$

Q4:

$$P = \begin{matrix} & \begin{matrix} y_1 & y_2 & y_3 & y_4 \end{matrix} \\ \begin{matrix} x_1 \\ x_2 \\ x_3 \\ x_4 \\ x_5 \end{matrix} & \begin{bmatrix} 0.1 & 0.5 & 0.4 & 0.2 \\ 0 & 0.7 & 0.7 & 0.6 \\ 0.3 & 0.4 & 0.6 & 0.3 \\ 0.5 & 0.5 & 0.5 & 0.5 \\ 0.3 & 0.6 & 0.2 & 0.9 \end{bmatrix} \end{matrix} \subseteq X \times Y$$

$$P_X = \begin{bmatrix} 0.5 \\ 0.7 \\ 0.6 \\ 0.5 \\ 0.9 \end{bmatrix} = \max_y \mu_P(x, y) = \bigvee_y \mu_P(x, y)$$

$$P_Y = \begin{bmatrix} 0.5 \\ 0.7 \\ 0.7 \\ 0.9 \end{bmatrix} = \max_x \mu_P(x, y) = \bigvee_x \mu_P(x, y)$$

Target:  $P \subseteq P_X \times P_Y$

$$\mu_P(x, y) \leq \bigvee_y \mu_P(x, y)$$

$$\mu_P(x, y) \leq \bigvee_x \mu_P(x, y)$$

$$\therefore \mu_P(x, y) \leq \left[ \bigvee_y \mu_P(x, y) \right] \wedge \left[ \bigvee_x \mu_P(x, y) \right] = \mu_{P_X}(x) \wedge \mu_{P_Y}(y) = \mu_{P_X \times P_Y}(x, y)$$