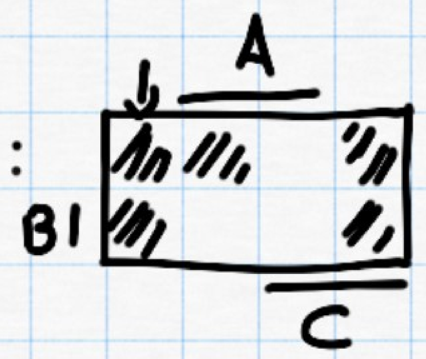
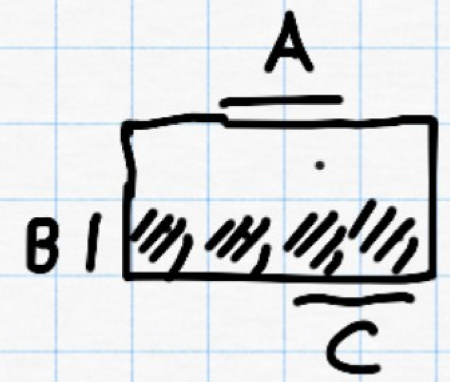
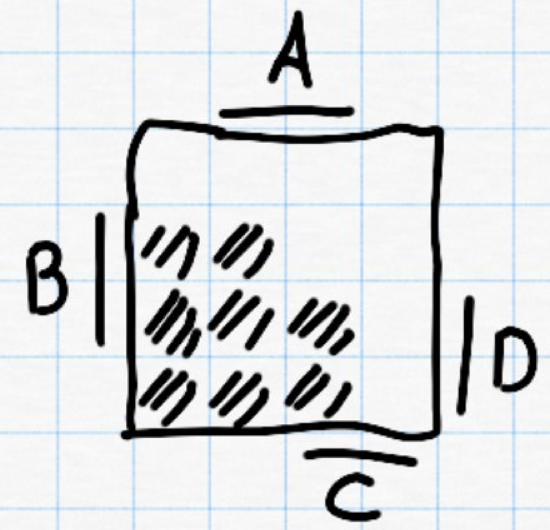
1.1.

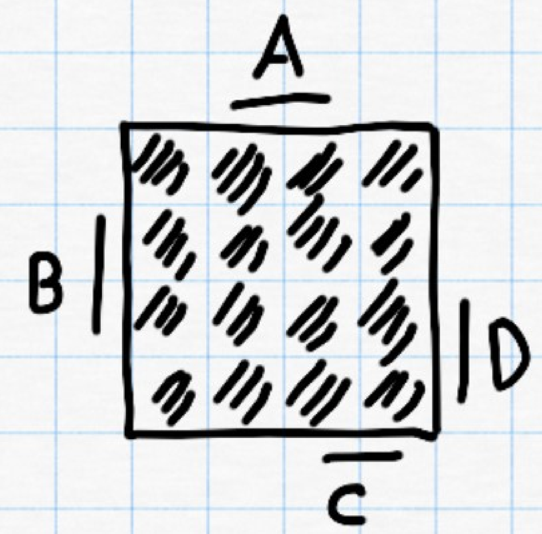
F_a: 

G_a: 

$\Omega = \{x\}$ $\quad$ $B = \emptyset$

$A = \emptyset$ $\quad$ $C = \emptyset$

F_b: 

G_b: 

$\Omega = \{x\}$ $\quad$ $B = \emptyset$ $\quad$ $D = \emptyset$

$A = \emptyset$ $\quad$ $C = \emptyset$

1.2 a) $\overline{(C\setminus A)\setminus\overline{(B\cup B)}} \equiv \overline{(C\setminus A)\setminus\overline{B}}$ $\quad$ $(B\cup B\equiv B)$

$\equiv \overline{(C\setminus A)\cap\overline{\overline{B}}}$ $\quad$ $(X\setminus Y\equiv X\cap\overline{Y})$

$\equiv \overline{(C\setminus A)\cap B}$ $\quad$ $(\overline{\overline{B}}\equiv B)$

b) $\overline{\overline{(\overline{C}\cup B)\cap(\overline{C}\cup A)}\cup\overline{B}} \equiv \overline{\overline{(\overline{C}\cup B)\cap(\overline{C}\cup A)}}\cap B$ $\quad$ $(\overline{X}\cup\overline{Y}\equiv\overline{X\cap Y})$

$\equiv (\overline{C}\cup B)\cap(\overline{C}\cup A)\cap B$ $\quad$ $(\overline{\overline{X}}\equiv X)$

$\equiv (\overline{C}\cup(B\cap A))\cap B$ $\quad$ $((X\cup Y)\cap(X\cup Z)\equiv X\cup(Y\cap Z))$

1.4 a) $|\{X\subseteq\Omega \mid |\Omega\setminus X| = 1\}| = 4$

$\rightarrow |X| = 3$ $\quad$ $X = \{a,b,c\}, \{a,b,d\}$

b) $|\{Y \subseteq \Omega \mid Y \cap \{a,b\} = Y \setminus \{c\}\}| = 8$

$$Y \cap \{a,b\} = Y \setminus \{c\} \rightarrow Y \subseteq \{a,b,c\}$$

$$|2^{\{a,b,c\}}| = 2^{|\{a,b,c\}|} = 2^3 = 8$$

c) $X = \Omega \setminus (X \Delta Y)$ $\quad \underline{Y = Y \cap \{a,b\}} \rightarrow Y \subseteq \{a,b\}$

$$X = \overline{(X \Delta Y)} = \overline{((X \cup Y) \setminus (X \cap Y))} = \overline{(X \cup Y) \cap \overline{(X \cap Y)}} =$$

$$\overline{(X \cup Y)} \cup (X \cap Y) = (\overline{X} \cap \overline{Y}) \cup (X \cap Y)$$

$$\rightarrow (\overline{X} \cap \overline{Y}) = \emptyset$$

$X = X \cap Y \rightarrow X \subseteq Y$ $\quad X \cup Y = \Omega$ $\quad X \subseteq Y \subseteq \{a,b\}$

$X \cup Y = Y = \Omega$

$\Rightarrow$ keine Lösung

1.5) $\Sigma = \{a,b,c\}$

Σ^ω : unendlich lange Wörter

A_k : k-te Stelle ein a

a) $\bigcap_{k \in \mathbb{N}_0} ((A_k \cap C_{k+1}) \cup B_k \cup C_k)$

b) $\bigcup_{k \in \mathbb{N}_0} (\bigcap_{i<k} B_i \cap A_k) \cup (\bigcap_{k \in \mathbb{N}_0} (B_k \cup C_k))$

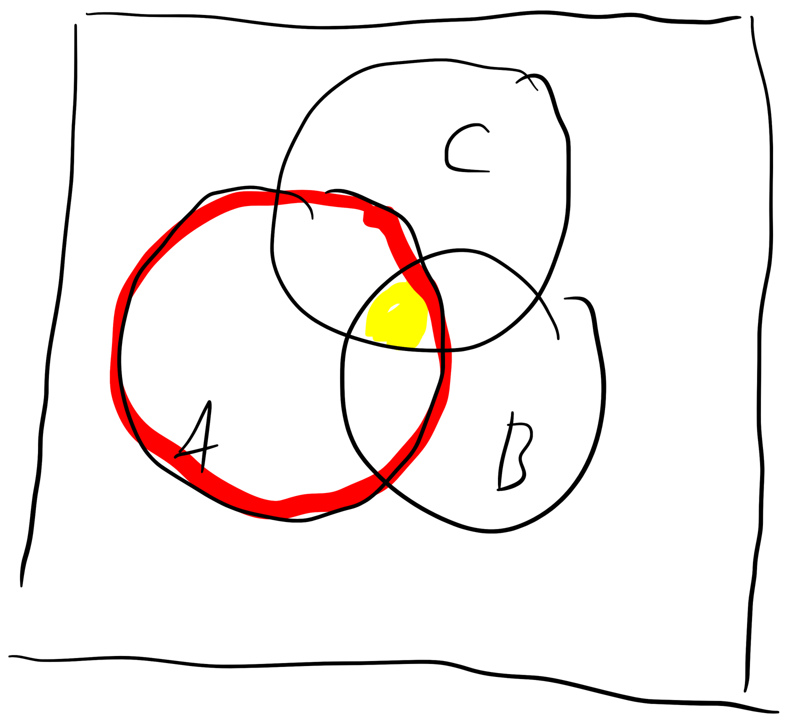
c) $$\left|\bigcup_{k\in\mathbb{N}_n}\left(\bigcap_{i<k}(B_i)\cap A_k\right)\right|$$

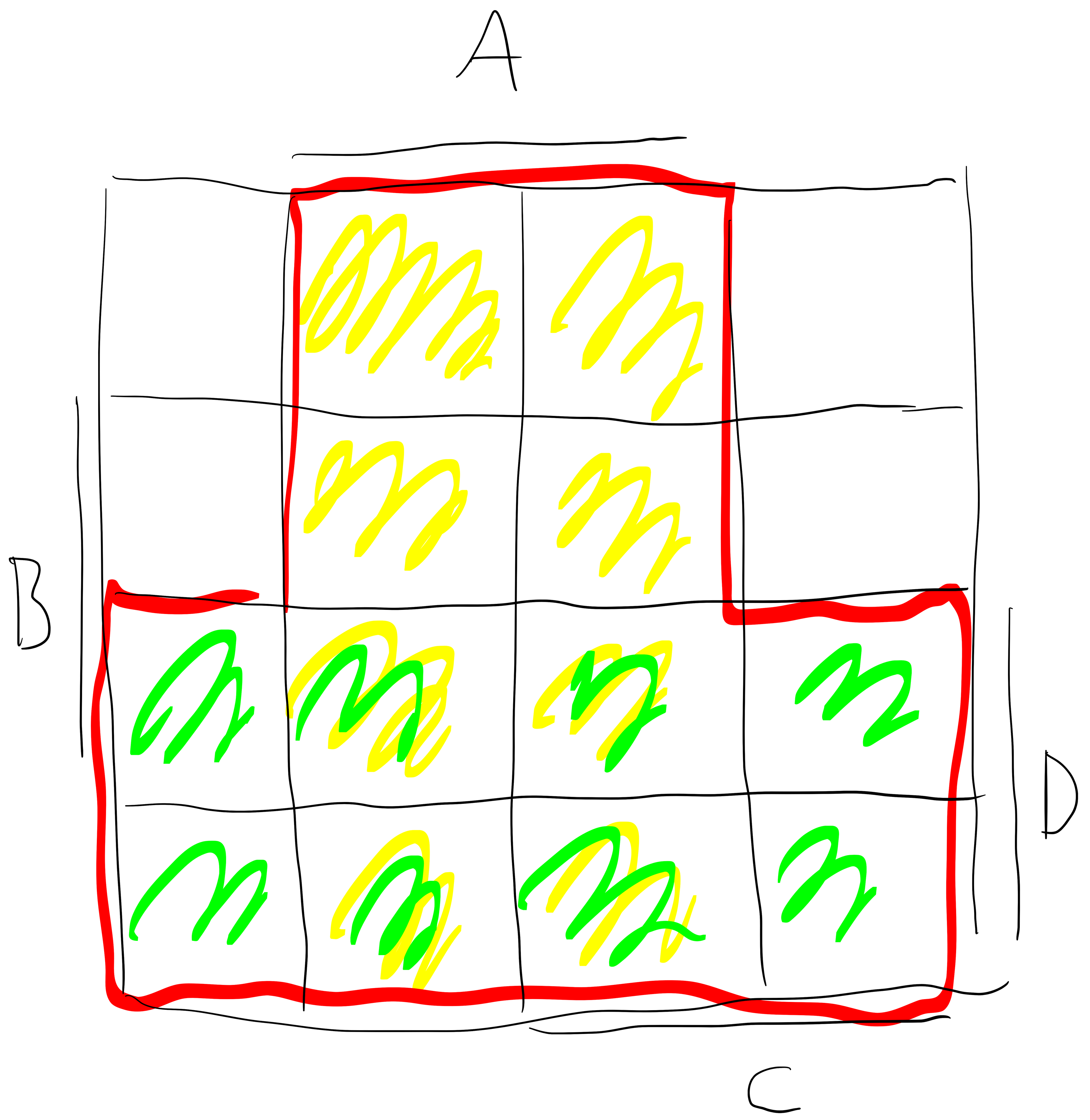
1.3

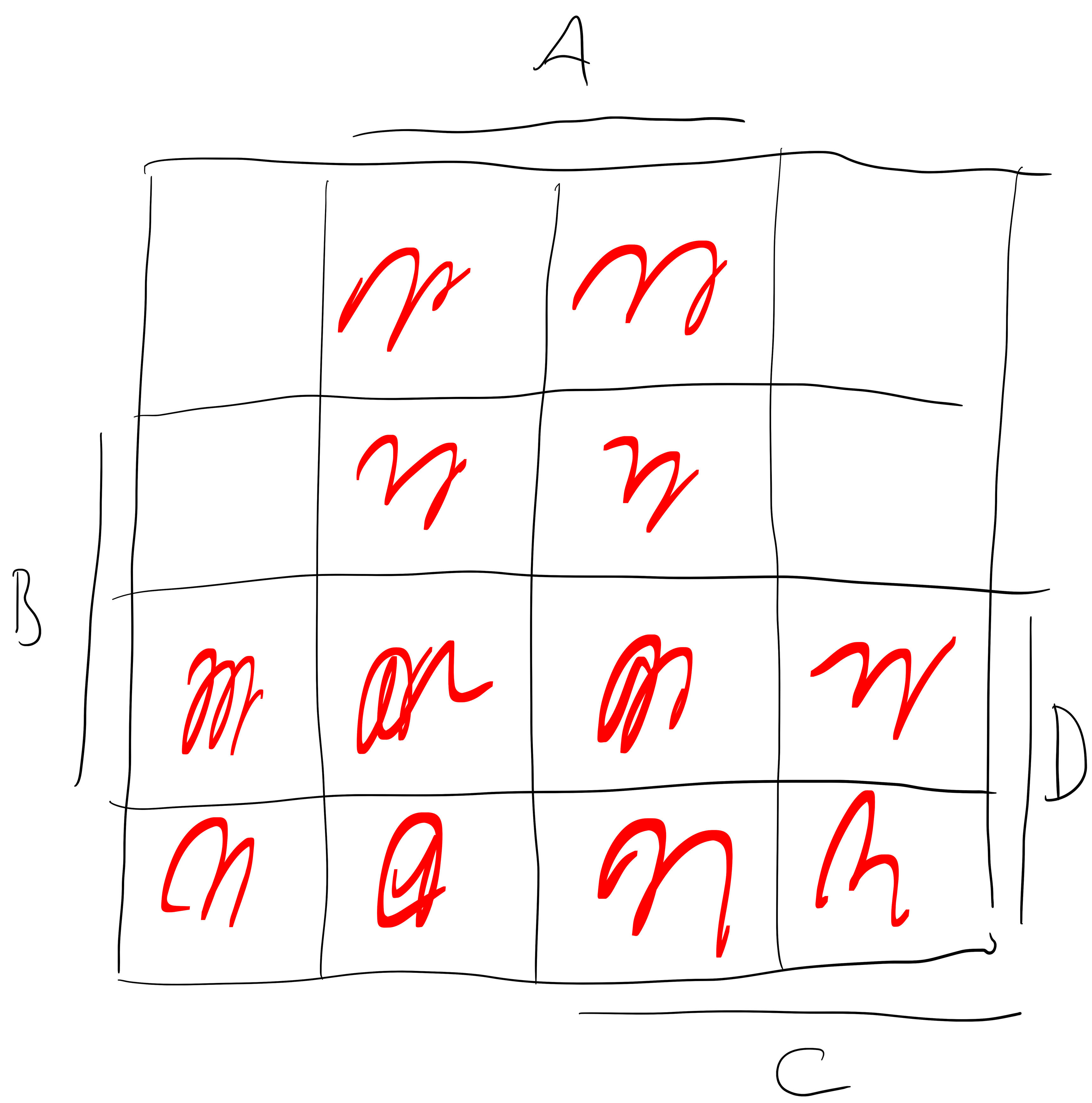
$$\bigcap_{i=1}^{r}\left(\bigcup_{j=1}^{l_i} M_{ij}\right)$$

a)

$$((B\cap A)\cap C)\cup\overline{(\overline{D}\setminus A)} = ((B\cap A)\cap C)\cup\overline{(\overline{D}\cap \overline{A})}$$
$$= ((B\cap A)\cap C)\cup(\overline{\overline{D}}\cup\overline{\overline{A}})$$
$$= ((B\cap A)\cap C)\cup(D\cup A)$$
$$= ((B\cap A\cap C)\cup A)\cup D$$
$$= A\cup D$$







1.3

b)

$$\bar{A} \cup \overline{((B \cup D) \setminus \bar{C})} = \bar{A} \cup \overline{((B \cup D) \cap \bar{\bar{C}})} = \bar{A} \cup \overline{((B \cup D) \cap C)}$$

$$= \bar{A} \cup (\overline{(B \cup D)} \cup \bar{C}) = \bar{A} \cup ((\bar{B} \cap \bar{D}) \cup \bar{C})$$

$$= \bar{A} \cup ((\bar{B} \cup \bar{C}) \cap (\bar{D} \cup \bar{C})) = (\bar{A} \cup \bar{B} \cup \bar{C}) \cap (\bar{A} \cup \bar{D} \cup \bar{C})$$