

ÜBUNG 1:

①

(1a) Menge A

0-el Teilmengen:	\emptyset
1-el	$\{\heartsuit\}, \{\spadesuit\}, \{\clubsuit\}, \{\diamondsuit\}$
2-el	$\{\heartsuit, \spadesuit\}, \{\heartsuit, \clubsuit\}, \{\heartsuit, \diamondsuit\}, \{\spadesuit, \clubsuit\}, \{\spadesuit, \diamondsuit\}, \{\clubsuit, \diamondsuit\}$
3-el	$\{\heartsuit, \spadesuit, \clubsuit\}, \{\heartsuit, \spadesuit, \diamondsuit\}, \{\heartsuit, \clubsuit, \diamondsuit\}, \{\spadesuit, \clubsuit, \diamondsuit\}$

Menge B

0-el Teilmengen:	\emptyset
1-el	$\{\square\}, \{\triangle\}, \{\diamondsuit\}$
2-el	$\{\square, \triangle\}, \{\square, \diamondsuit\}, \{\triangle, \diamondsuit\}$
3-el	$\{\square, \triangle, \diamondsuit\}$

(1b)

$$|\mathcal{P}(A)| = 2^{|A|} = 2^4 = 16.$$

$$|\mathcal{P}(B)| = 2^{|B|} = 2^3 = 8$$

(1c)

$$\begin{array}{l|l} \mathcal{C}\{\heartsuit\} = \{\heartsuit, \spadesuit, \clubsuit, \diamondsuit\} & \mathcal{C}\{\triangle, \diamondsuit\} = \{\square\} \\ \mathcal{C}\{\spadesuit\} = \{\heartsuit, \spadesuit, \clubsuit, \diamondsuit\} & \\ \mathcal{C}\{\clubsuit\} = \{\heartsuit, \spadesuit, \clubsuit, \diamondsuit\} & \\ \mathcal{C}\{\diamondsuit\} = \{\heartsuit, \spadesuit, \clubsuit, \diamondsuit\} & \end{array}$$

(1d)

$$A \cup B = \{\heartsuit, \spadesuit, \clubsuit, \diamondsuit, \square, \triangle\}$$

$$A \cap B = \{\diamondsuit\}$$

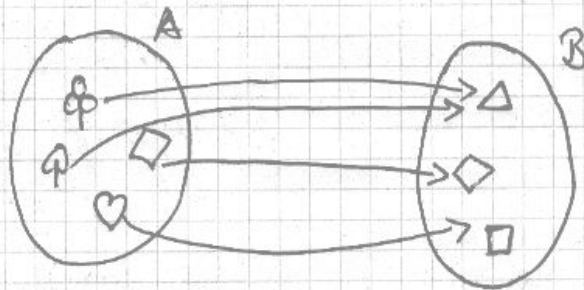
(1e)

$$A \times B = \{(\heartsuit, \square), (\heartsuit, \triangle), (\heartsuit, \diamondsuit), (\spadesuit, \square), (\spadesuit, \triangle), (\spadesuit, \diamondsuit), (\clubsuit, \square), (\clubsuit, \triangle), (\clubsuit, \diamondsuit), (\diamondsuit, \square), (\diamondsuit, \triangle), (\diamondsuit, \diamondsuit)\}$$

$\{\heartsuit, \square, (\heartsuit, \Delta), (\heartsuit, \diamond),$
 $(\diamond, \square), (\diamond, \Delta), (\diamond, \diamond)\}$

(2)

(18) z.B.

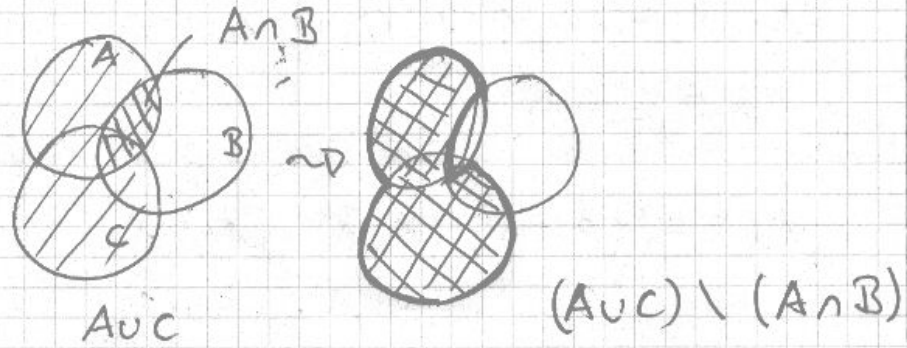


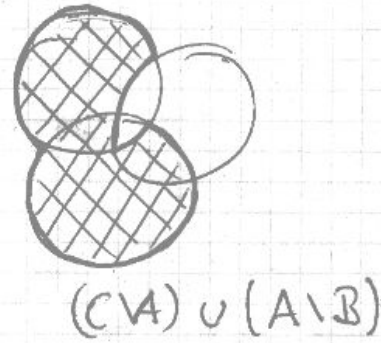
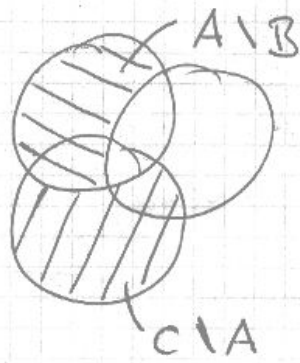
(2) Es stehen 4 Plätze für die Elemente zur Verfügung.
 Nachdem das erste Element angeordnet ist bleiben noch 3 Plätze für das 2. Element.
 Für das 3. Element noch 2 Plätze
 Für das letzte Element noch 1 Platz
 Also $4 \cdot 3 \cdot 2 \cdot 1 = 4! = 24$ Möglichkeiten

Menge A

Menge B [Argumentiere analog: $3! = 6$ Möglichkeiten
 1. $\square, \Delta, \diamond$ 2. $\square, \diamond, \Delta$ 3. $\diamond, \square, \Delta$
 4. $\diamond, \Delta, \square$ 5. $\Delta, \diamond, \square$ 6. $\Delta, \square, \diamond$

(19)

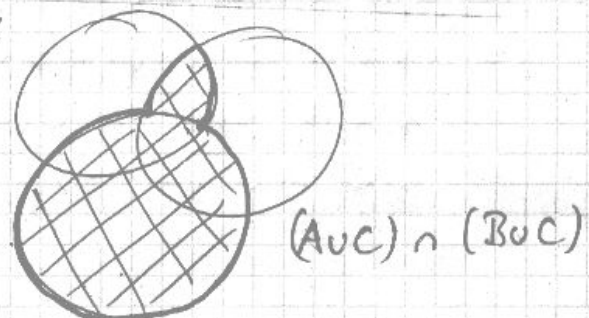
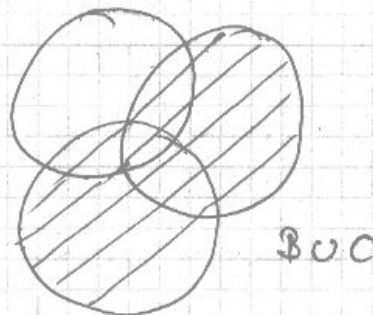
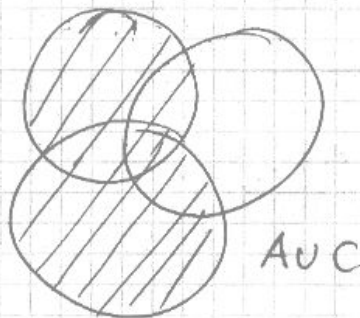
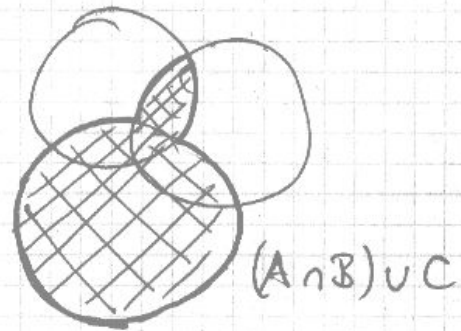
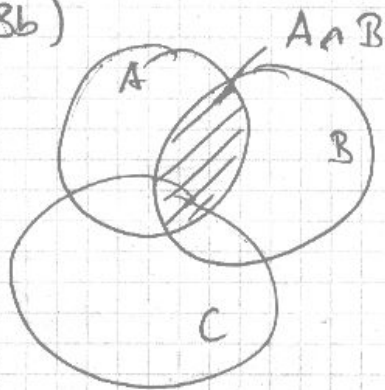




(3)

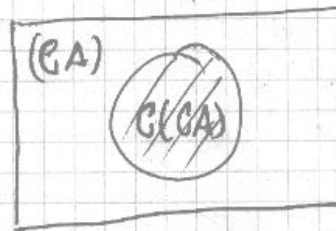
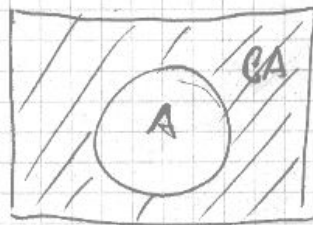
also $(A \cup C) \setminus (A \cap B) = (C \setminus A) \cup (A \setminus B)$

(8b)



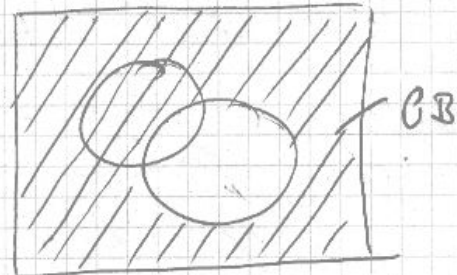
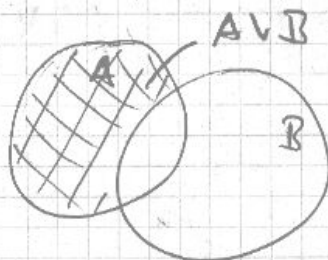
also $(A \cup C) \cap (B \cup C) = (A \cap B) \cup C$

(3c)

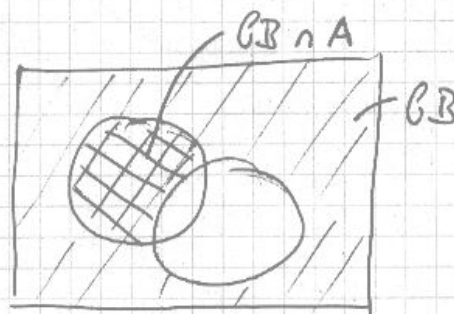


also $C \setminus A = A$

(3d)



also $A \setminus B = A \cap CB$



(4) $(A \cup B) \cap (A \cup C) \subseteq A \cup (B \cap C)$:

Sei $x \in (A \cup B) \cap (A \cup C)$

$\Rightarrow x \in (A \cup B)$ und $x \in (A \cup C)$

$\Rightarrow (x \in A \text{ oder } x \in B)$ und $(x \in A \text{ oder } x \in C)$

$\Rightarrow x \in A$ oder $(x \in B \text{ und } x \in C)$

$\Rightarrow x \in A$ oder $x \in (B \cap C)$

$\Rightarrow x \in A \cup (B \cap C)$

$$\underline{A \cup (B \cap C) \subseteq (A \cup B) \cap (A \cup C)}$$

(5)

$$\text{Sei } x \in A \cup (B \cap C)$$

$$\Rightarrow x \in A \text{ oder } x \in (B \cap C)$$

$$\Rightarrow x \in A \text{ oder } (x \in B \text{ und } x \in C)$$

$$\Rightarrow (x \in A \text{ oder } x \in B) \text{ und } (x \in A \text{ oder } x \in C)$$

$$\Rightarrow x \in (A \cup B) \text{ und } x \in (A \cup C)$$

$$\Rightarrow x \in (A \cup B) \cap (A \cup C)$$

$$\text{Also } A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$$