# 3. feladatsor – Halmazok

**3.1. Feladat megoldása.**

**(a)** Igaz
**(b)** Igaz
**(c)** Igaz
**(d)** Igaz
**(e)** Hamis
**(f)** Igaz
**(g)** Igaz
**(h)** Igaz

**3.2. Feladat megoldása.**

- $A \cup B = \{a, b, c, d, e\} = U$;
- $A \cap B = \{d\}$;
- $\overline{B} = \{a, b, c\}$;
- $A \setminus B = \{a, b, c\}$;
- $A \triangle B = \{a, b, c, e\}$;
- $\left(A \triangle \overline{C}\right) \setminus \overline{B} = \emptyset$;
- $\mathcal{P}(B) = \{\emptyset, \{d\}, \{e\}, \{d, e\}\}$.

**3.3. Feladat megoldása.**

$$A = \{\emptyset, \{a\}, \{b\}, \{a, b\}\}, \quad B = \{\emptyset, \{b\}, \{c\}, \{b, c\}\}$$

- $A \cup B = \{\emptyset, \{a\}, \{b\}, \{c\}, \{a, b\}, \{b, c\}\}$
- $A \cap B = \{\emptyset, \{b\}\}$
- $A \setminus B = \{\{a\}, \{a, b\}\}$
- $B \setminus A = \{\{c\}, \{b, c\}\}$
- $A \triangle B = \{\{a\}, \{c\}, \{a, b\}, \{b, c\}\}$

**3.4. Feladat megoldása.** $\mathcal{P}(\mathcal{P}(\mathcal{P}(\emptyset))) = \{\emptyset, \{\emptyset\}, \{\{\emptyset\}\}, \{\emptyset, \{\emptyset\}\}\}$

**3.5. Feladat megoldása.**

**(a)** Igen
**(b)** Igen
**(c)** Nem
**(d)** Nem
**(e)** Nem
**(f)** Nem

**3.6. Feladat megoldása.**

**(a)** $\mathcal{C}_1 = \{\{1, 2\}, \{3, 4\}, \{5, 6\}, \{7\}\}$
**(b)** $\mathcal{C}_2 = \{\{1, 2\}, \{3, 4\}, \{5, 6, 7\}\}$
**(c)** $\mathcal{C}_3 = \{\{1, 2, 3\}, \{4, 5, 6, 7\}\}$
**(d)** Nincs ilyen osztályozás.

**3.7. Feladat megoldása.**

**(a)** $(A \setminus B) \setminus B = A \setminus B$
**(b)** $A = (A \cup B) \setminus (B \setminus A)$
**(c)** $A \setminus (B \setminus C) \neq (A \setminus B) \setminus C$
**(d)** $A \cap (B \cup C) \neq (A \cup B) \cap (A \cup C)$
**(e)** $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$
**(f)** $(A \cap B) \setminus (B \setminus (A \cup C)) = A \cap B$
**(g)** $(A \triangle B) \triangle (A \cap B) = A \cup B$

**3.8. Feladat megoldása.** $\overline{A \cup (B \cap (C \cup D))} = \overline{A} \cap \left(\overline{B} \cup \left(\overline{C} \cap \overline{D}\right)\right)$

**3.9. Feladat megoldása.** Van: $A = \emptyset$, $B = \{\emptyset\}$, $C = \{\emptyset, \{\emptyset\}\}$.

**3.10. Feladat megoldása.** $A \subseteq B$ teljesül, $A = B$ és $B \setminus A = \emptyset$ nem teljesül.

**3.11. Feladat megoldása.**

**(a)**

$$\begin{aligned} x \in (A \cap C) \cup (B \cap D) &\longleftrightarrow x \in (A \cup (B \cap D)) \cap (C \cup (B \cap D)) \\ &\longleftrightarrow x \in (A \cup B) \cap (A \cup D) \cap (C \cup B) \cap (C \cup D) \\ &\longrightarrow x \in (A \cup B) \cap (C \cup D) \end{aligned}$$

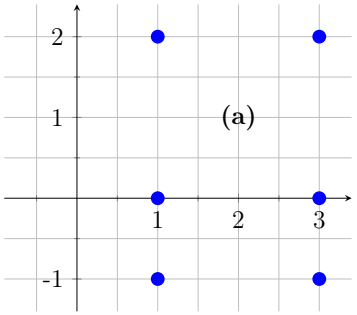
**(b)**

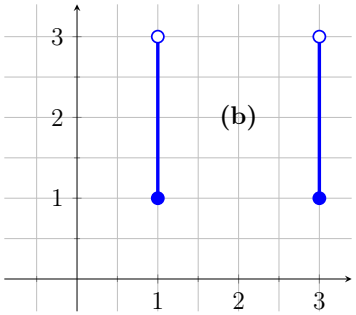
$$\begin{array}{rl} & x \in C \cup D \longrightarrow x \notin B \cap \overline{(C \cup D)} = B \setminus (C \cup D) \\ \nearrow & \\ x \in A \cap C \cap D & \\ \searrow & \\ & x \in A \cap C \\ \longrightarrow \; x \in & (A \cap C) \setminus (B \setminus (C \cup D)) \end{array}$$

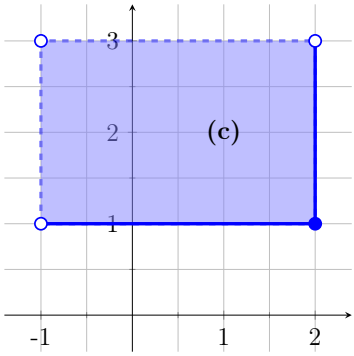
**3.12. Feladat megoldása.**

- $A \sqcap A = \overline{A \cap A} = \overline{A}$
- $(A \sqcap B) \sqcap (A \sqcap B) = \overline{A \sqcap B} = \overline{\overline{A \cap B}} = A \cap B$
- $A \cup B = (A \sqcap A) \sqcap (B \sqcap B)$

**3.13. Feladat megoldása.**




**3.14. Feladat megoldása.**

| | |
|---|---|
| Igen | Igen |
| Nem | Nem |