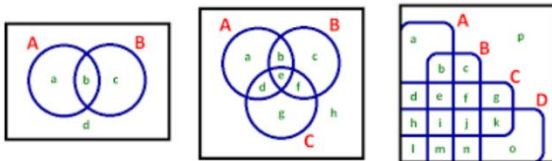


Množinové operácie

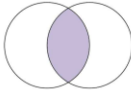
- Intervaly

- **Uzavretý interval** $\langle a, b \rangle = \{x; a \leq x \leq b\}$
- **Otvorený interval** $(a, b) = \{x; a < x < b\}$
- **Zľava otvorený a sprava uzavretý interval** $(a, b] = \{x; a < x \leq b\}$
- **Sprava otvorený a zľava uzavretý interval** $\langle a, b) = \{x; a \leq x < b\}$
- **Pozor: $a < b$!!!**
 - $\langle 3, 2 \rangle = \{x \in \mathbb{R}; 3 \leq x \leq 2\} = \emptyset = \{\}$
 - $\langle 3, 3 \rangle = \{3\}$ – **degenerovaný interval** (Hlinená ho zakazuje)

- Vennove diagramy

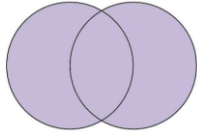


- Množinové operácie

- **Prienik množín $\rightarrow A \cap B$:**
 - **Diagram:**
 - **Definícia:**
 - $A \cap B = \{x; x \in A \wedge x \in B\}$
 - $(x \in A \cap B) \Leftrightarrow [(x \in A) \wedge (x \in B)]$
 - $(x \notin A \cap B) \Leftrightarrow [(x \notin A) \vee (x \notin B)]$
 - **Príklad:**
 - $A = \{1, 2, 3\}$
 - $B = \{3, 4, 5\}$
 - $A \cap B = \{3\}$
 - $C = \langle 0, 3 \rangle$
 - $D = (2, 4 \rangle$
 - $C \cap D = (2, 3 \rangle$
 - **Vlastnosti:**
 - **Komutatívna vlastnosť** $\rightarrow A \cap B = B \cap A$
 - **Asociatívna vlastnosť** $\rightarrow (A \cap B) \cap C = A \cap (B \cap C)$
 - $A \cap \emptyset = \emptyset$
 - $A \cap A = A$

○ Zjednotenie množín $\rightarrow A \cup B$

▪ Diagram:



▪ Definícia:

- $A \cup B = \{x: x \in A \vee x \in B\}$
- $(x \in A \cup B) \Leftrightarrow [(x \in A) \vee (x \in B)]$
- $(x \notin A \cup B) \Leftrightarrow [(x \notin A) \wedge (x \notin B)]$

▪ Príklad:

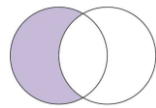
- $A = \{1, 2, 3\}$
- $B = \{3, 4, 5\}$
- $A \cup B = \{1, 2, 3, 4, 5\}$
- $C = \langle 0, 3 \rangle$
- $D = \langle 2, 4 \rangle$
- $C \cup D = \langle 0, 4 \rangle$

▪ Vlastnosti:

- **Komutatívna vlastnosť** $\rightarrow A \cup B = B \cup A$
- **Asociatívna vlastnosť** $\rightarrow (A \cup B) \cup C = A \cup (B \cup C)$
- $A \cup \emptyset = A$
- $A \cup A = A$

○ Rozdiel množín $A \setminus B$:

▪ Diagram:



▪ Definícia:

- $A \setminus B = \{x: x \in A \wedge x \notin B\}$
- $(x \in A \setminus B) \Leftrightarrow [(x \in A) \wedge (x \notin B)]$
- $(x \notin A \setminus B) \Leftrightarrow [(x \notin A) \vee (x \in B)]$

▪ Príklad:

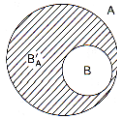
- $A = \{1, 2, 3\}$
- $B = \{3, 4, 5\}$
- $A \setminus B = \{1, 2\}$
- $B \setminus A = \{4, 5\}$
- $C = \langle 0, 3 \rangle$
- $D = \langle 2, 4 \rangle$
- $C \setminus D = \langle 0, 2 \rangle$

▪ Vlastnosti:

- $A \setminus \emptyset = A$
- $A \setminus A = \emptyset$

○ **Doplnok množiny \bar{A}_x alebo $(A)'_x$:**

▪ **Diagram:**



▪ **Definícia:**

- $(A)'_x = \{x \in X : x \in X \wedge x \notin A\}$
- $(x \in (A)'_x) \Leftrightarrow [(x \in X) \wedge (x \notin A)]$
- $(x \notin (A)'_x) \Leftrightarrow [(x \notin X) \vee (x \in A)]$

▪ **Príklad:**

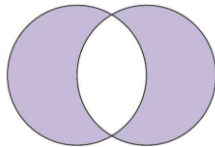
- $x = \mathbb{R}$
- $A = \langle 1, 3 \rangle$
- $A'_x = (-\infty, 1) \cup \langle 3, \infty \rangle$
- $\varphi = \langle 0, 7 \rangle$
- $A'_\varphi = \langle 0, 1 \rangle \cup \langle 3, 7 \rangle$

▪ **Vlastnosti:**

- $(A'_x)'_x = A$
- $(A \cup B)'_x = A'_x \cap B'_x$
- $(x \notin A \cup B) \Leftrightarrow [(x \notin A) \wedge (x \notin B)]$
- $(A \cap B)'_x = A'_x \cup B'_x$
- $(x \notin A \cap B) \Leftrightarrow [(x \notin A) \vee (x \notin B)]$

○ **Symetrický rozdiel množín $A\Delta B$:**

▪ **Diagram:**



▪ **Definícia:**

- $A\Delta B = (A \setminus B) \cup (B \setminus A) = (A \cup B) \setminus (A \cap B)$

▪ **Príklad:**

- $A = \{1, 2, 3\}$
- $B = \{3, 4, 5\}$
- $A\Delta B = \{1, 2, 4, 5\}$

▪ **Vlastnosti:**

- **Komutatívna vlastnosť** $\rightarrow A\Delta B = B\Delta A$
- **Asociatívna vlastnosť** $\rightarrow (A\Delta B)\Delta C = A\Delta(B\Delta C)$

○ **Kartézsky súčin $A \times B$:**

▪ **Diagram:**

- Nedá sa

▪ **Definícia:**

- $A \times B = \{[x, y]; x \in A \wedge y \in B\}$
- $([x, y] \in A \times B) \Leftrightarrow [(x \in A) \wedge (y \in B)]$
- $([x, y] \notin A \times B) \Leftrightarrow [(x \notin A) \vee (y \notin B)]$

▪ **Príklady:**

- $A = \{a, b\}$
 - $B = \{c, d\}$
 - $A \times B = \{[a, c], [a, d], [b, c], [b, d]\}$
 - $B \times A = \{[c, a], [c, b], [d, a], [d, b]\}$
- **Vlastnosti:**
- $A \times A \times A \dots \times A = A^n$
 - $A \times B \neq B \times A$
 - $|A| = m; |B| = n; |A \times B| = m * n; |B \times A| = n * m$